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Vol. 2**

**Pennsylvania. Board of Canal
Commissioners.**

**Report of the Canal
Commissioners of
Pennsylvania, relative to**

Pen. & Canals
836-1837
REPORT

OF THE

CANAL COMMISSIONERS

OF

PENNSYLVANIA,

RELATIVE TO THE

PENNSYLVANIA CANALS

AND

RAIL-ROADS.

READ IN THE HOUSE OF REPRESENTATIVES, Dec. 22, 1830.

HARRISBURG:

PRINTED BY HENRY WELSH.

1830.

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V.I

BOOK
OF
THE
BIBLE
AND
THE
LAW

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REPORT

OF THE

CANAL COMMISSIONERS.

CANAL COMMISSIONERS' ROOM,

December 21, 1830.

HIS EXCELLENCY GEORGE WOLF,
Governor of Pennsylvania.

By order of the Board of Canal Commissioners, I have the honor of transmitting to you, their annual report and accompanying documents.

Very respectfully,
JAS. S. STEVENSON,
President of the Board of Canal Commissioners.

The Canal Commissioners of Pennsylvania respectfully submit the following Report:

That in pursuance of the notice of their being continued as the board of canal commissioners, under the act reducing the number of its members, they met at Harrisburg the first day of their official year, and immediately entered upon their duties.

The commissioners, knowing the anxiety of the legislature and citizens of the commonwealth, in relation to the deep interests involved in the state canal, and the importance of its early completion, determined to exert all the power with which they were invested to cause the canal and rail way, to the entire extent authorized by law, to be finished within the present year. They were aware that to accomplish this would require great and persevering exertions on the part of the officers and agents in the service of the state, and with the hope that the presence of the board on the respective divisions to authorize and enforce prompt

and necessary measures, would produce beneficial results, the board concluded to visit the whole line of canal and rail-way as early in the year as possible. By such visit the members of the board could acquire a personal knowledge of every part of the canal; would be enabled to compare the works planned and executed under different engineers; could decide upon the advantages or disadvantages of different arrangements and designs, and authorize the adoption of whatever they believed was most economical and beneficial. Such visit would also afford the opportunity of an acquaintance with the habits, acquirements and competency of the officers and agents on the canal, and would better enable the commissioners to decide upon the justice of claims for damages.

The immediate inspection of the works appeared the more indispensable, as no general examination had been made by any former board, doubtless from the opinion that this service did not come within the range of their duty, under the laws then existing.

The commissioners, therefore, after taking such measures, before leaving Harrisburg, as seemed necessary to insure activity on the several divisions, until reached by the board, adjourned to Johnstown, at which place they commenced their examinations of the canal, on the 5th of July, and continued this duty along the western division to Pittsburg.

From Pittsburg the board proceeded to the head of the Juniata division, and from thence pursued their inspection through the whole line of canal and rail way east of the mountains, giving, as they progressed, such instructions to the agents on the works as seemed most advisable. This tour of duty terminated at Harrisburg, on the 16th of September.

After remaining some time at Harrisburg, attending to the business most pressing on the board, the commissioners separated to give their attention severally on different divisions, with a view to urge the completion of the work in their charge.

The result of the operations of the season have been satisfactory to the commissioners, as they have been enabled to accomplish the leading duty assigned them. The water has been admitted into four hundred and six miles of canal; twenty miles more being the whole extent authorized, requires but the completion of a few pieces of work to be declared finished.

The forty miles of rail way bed directed to be placed under contract, has been graded, bridged and completed, ready for the reception of the rails, excepting only a small amount of work on two sections, and on two bridges.

When it is considered that the first appropriation for the Pennsylvania canal was made as late as the 25th of February, 1826, and then only to the small amount of three hundred thousand dollars; that the first contracts are dated the last of June, 1826; that the first ground was broken the 4th of July of that year, and that now within the year 1830, four hundred and twenty-six miles of canal has been finished, and a considerable part of this through a

country peculiarly difficult, it cannot but be acknowledged that though there have been many errors to regret, there has been also much effected, flattering to the power and beneficial to the interests of the state. Within the short period of four years and five months, an immense amount of labour on our public works has been done, and although unfortunate arrangements and excessive expenditures have, in some cases, taken place, yet great progress has been made in the mighty task the state has undertaken. Much experience has been gained and many errors may, in future, be avoided. Skillful engineers, contractors and workmen have been multiplied, and their capabilities ascertained. The necessity of employing none but faithful, intelligent and experienced engineers, the exclusion of all favoritism, and the strict enforcement of economy in the construction of our public works, has become obvious to all.

The canal and rail-way as far as authorized, being completed, the board are now enabled to make such statements as regards the principal features, general structure and actual cost of these improvements as will give the citizens of the commonwealth (at whose expense they were constructed) a better acquaintance with their great public works than it has hitherto been in the power of the commissioners to present in their annual reports. A condensed view of the leading facts relating to the state canals and of the principal works in its construction presented in a single document, accessible to all, may prove satisfactory to many who have not opportunities of general information on this subject, and may furnish some useful data for calculation and comparison,

In the plan of the Pennsylvania canal, two principal leading lines of communication have been kept in view. The great central line from Philadelphia, crossing the Susquehanna at the mouth of the Juniata, and extending westward to the Ohio river at Pittsburg, and the line diverging from this at the mouth of the Juniata, and pursuing the course of the Susquehanna to Northumberland, and from thence the courses of the West and North branches of that river, with the view of being finally extended throughout the important northern region of the state. The completion of the central line from the mouth of the Juniata to Philadelphia is evidently of equal interest to the east, west and north.

The length of the central line of rail-way and canal from Philadelphia to Pittsburg is three hundred and ninety-seven miles. The water has been introduced into two hundred and ten miles of this line, and twenty miles more are nearly ready to receive it. The central line has been arranged into the following divisions, viz:

THE RAIL ROAD DIVISION, extending from Columbia to Philadelphia. The whole length of the division from the intersection of Vine and Broad streets, in Philadelphia, to the south end of the canal basin at Columbia, is eighty one miles and three-fourths of a mile. Forty and a half miles of the road bed has been prepared to receive the rails. No other work has been authorized on this division.

CANAL DIVISIONS.

The **EASTERN DIVISION**, extends from the termination of the rail-road at Columbia, to the outlet lock on Duncan's Island, and is forty two miles and eighty-five hundredths of a mile in length.

Twenty-four miles of this division are navigable. Ten miles more nearly finished. The balance not authorized to be placed under contract.

Part of the Susquehanna division, extending from the outlet lock at Duncan's Island, to the commencement of the Juniata division, on said island. The length of this part of the canal is one mile and fifty eight hundredths of a mile. This portion of the line is navigable.

The **JUNIATA DIVISION** division, extending from its junction with the Susquehanna division, on Duncan's Island, to the end of section No. 184, one fourth of a mile above Huntingdon, and being eighty-nine miles and five hundredths of a mile in length.

Eighty miles of this division are navigable, the remainder only requires the completion of two aqueducts.

The **CANAL AND SLACK-WATER DIVISION**, proposed to extend from the end of the canal at Huntingdon, to the head of the canal basin, near Hollidaysburg, as designed by Moncure Robinson. The length of this division will be thirty-nine miles.

No part of this division has been authorized to be placed under contract.

RAIL-WAY OR MACADAMIZED TURNPIKE, extending from the head of the basin, near Hollidaysburg, located by Moncure Robinson, and following the route and plan proposed by him, to the head of the basin, at Johnstown, the distance is thirty-seven miles ninety-three hundredths of a mile.

Various surveys have been made, and different routes and plans have been proposed for this portage, but no part of the line has been authorized to be placed under contract. The lowest depression of the Allegheny mountain, within the range of the portage, is at Sugar Run Gap, and this is one thousand three hundred and sixty-four feet seven inches above top water in the basin, at Hollidaysburg; one thousand one hundred and forty-one feet above the top water line of the basin at Johnstown, and one hundred feet above the bottom of the tunnel, proposed by Moncure Robinson, in his report of last year.

The **WESTERN DIVISION** of the Pennsylvania canal, extending from the head of the basin at Johnstown, to the out-let lock, into the Monongahela river at Pittsburg. The whole length of this division is one hundred and four miles and thirty-three hundredths of a mile.

This division of the canal, is navigable throughout its whole course, as is also a branch of three fourths of a mile in length, which leads into the Allegheny river, at the town of Allegheny.

The divisions leading northward, from the Juniata, at Duncan's island, and their several lengths are as follows:

The **SUSQUEHANNA DIVISION**, extending from the out-let lock into the Susquehanna, at Duncan's island, to the south end of the towing path bridge at Northumberland. The length of this division is thirty-nine miles. This division is in navigable order.

The **WEST BRANCH DIVISION**, extending from the south end of the towing path bridge, at Northumberland, to the end of the towing path, one mile and one fourth above the feeder dam, at Muncy ripples. This division, is twenty-four miles and a half in length, and is in navigable order.

The **NORTH BRANCH DIVISION**, extends from its point of intersection with the west branch, in the basin, in the town of Northumberland, to the feeder dam at Nanticoke falls, and is fifty-five miles and a half in length.

The water has been admitted into this division, but it is not yet entirely navigable. The slackwater, extends five miles above the Nanticoke dam, and within two miles and a half of Wilkesbarre.

The other divisions of canal are,

The **DELAWARE DIVISION**. This extends from the tide basin at Bristol, to the north side of the feeder dam at Easton. Its length is fifty-nine miles and three fourths. The water has been admitted into this division, but only twenty-five miles are yet navigable. Part of the work first constructed, has proved defective, and requires extensive repairs.

The **FRENCH CREEK FEEDER**, extends from near Bemus' mill, on French creek, to its termination at Muddy run. Its length is nineteen miles and a half. The water has been admitted into this line from some small streams.

Although the canal and rail way has been arranged into divisions, and these into lines, and though no connection is meditated between some of the divisions, yet appropriations have been made under the general name of the Pennsylvania canal and rail way. Accounts have, however, been kept, with reference to divisions and lines.

From these accounts, it appears that the whole amount of moneys appropriated for the Pennsylvania canal and rail road, and placed at the disposal of the canal commisssioners, up to the 10th of December, 1830, has been ten millions two hundred and eighty-eight thousand three hundred and nine dollars and fifty-nine cents.

The whole amount drawn from the treasurer, after deducting all sums repaid, has been ten millions two hundred and eighty-three thousand seven hundred and sixty-eight dollars and eighty-nine cents.

These sums have been drawn under the following heads:

WESTERN DIVISION.

By superintendents of construction,

\$2,567,496 94

By supervisors,

41,600 00

\$2,609,096 94

JUNIATA DIVISION.

By superintendents, &c.	\$2,240,301 16	
Supervisors,	16,689 47	
	<hr/>	\$2,256,990 63

DELAWARE DIVISION.

By superintendents, &c.	1,168,385 61	
Supervisors,	10,000 00	
	<hr/>	1,178,385 61

EASTERN DIVISION.

By superintendents, &c.	1,202,830 11	
Supervisors,	11,233 64	
	<hr/>	1,214,063 75

NORTH BRANCH DIVISION.

By superintendents, &c.	1,002,483 03	
Supervisors,	5,000 00	
	<hr/>	1,007 483 03

WEST BRANCH DIVISION.

By superintendents, &c.	349,004,87½	
Supervisors,	5,600 00	
	<hr/>	354,604 87½

FRENCH CREEK FEEDER.

By superintendents, &c.	287,103 72	
Supervisors,	5,00000	
	<hr/>	292,103 72

RAIL ROAD.

By superintendents, &c.		287,584 56½
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SUSQUEHANNA DIVISION.

By superintendents, &c.	1,039,256 77	
Supervisors,	9,200 00	
	<hr/>	1,048,456 77
Board of canal commissioners,		29,000 00
Board of appraisers,		54 00
Board of internal improvement,		5,990 00
Balance in the treasury,		4,540 70
		<hr/>
		\$10,288,309 59

Of the amount thus drawn, settlements have been made at the treasury, of upwards of ten millions one hundred and fifty thousand dollars, and the accounts shewing the application of the balance, are in a train of adjustment.

It will be perceived that to form the necessary connections between the parts of the canal already finished, so as to fulfil the original design, and render the canal productive, will require the completion of the rail-way between Philadelphia and Columbia; the completion of nine miles of canal between Middletown and Marietta; of thirty-nine miles of canal and slack water navigation;

and of thirty-eight miles of portage road, between the canal at Huntingdon, and the canal at Johnstown. These works may be justly viewed as necessary and profitable connexions, and not as extensions. The Board have therefore deemed it proper to embrace them in this statement, in relation to the general work.

As a brief view of the several divisions of the canal and rail-way, and of the necessary connecting works, may be satisfactory, the following remarks are made.

The Philadelphia and Columbia Division of the Pennsylvania rail-road, commences at Philadelphia, and runs westward, through the counties of Philadelphia, Montgomery, Delaware, Chester and Lancaster to Columbia, and there connects with the great central line of canal and portage, leading to Pittsburg, on the Ohio river; from which point an extensive steam boat navigation opens through the vast and productive regions, pervaded by the waters of the Mississippi and its tributary rivers.

The line of location from Philadelphia to the foot of the Schuylkill inclined plane, has not yet been determined. Two principal routes have been specially urged. The one commences at the intersection of Vine and Broad streets, passes along the bed of the abandoned canal, and crosses the Schuylkill, to the foot of the plane, at Peters' farm. The other crosses the Schuylkill at Fairmount, and passes up the western side of that river, to the said plane.

It must be admitted that the weight of public opinion at Philadelphia, favours the first named location. That the line is somewhat shorter, and that by adopting the course and level of the canal bed, the work can be effected at less cost than on the Fairmount route. It is urged, however, by the advocates of the Fairmount route, that the difference of distance and cost will be inconsiderable, and that a large interest west of the Schuylkill, will be respected by running the rail-way to the head of tide, in the Schuylkill, before crossing that stream.

The advocates of each plan, will doubtless submit their views for legislative decision.

The whole line of the Pennsylvania rail-road, from the intersection of Vine and Broad streets, pursuing the old canal line, and crossing at Peters' farm, (which route is assumed with a view to a definite statement of length and cost) to the end of the canal basin, at Columbia, is eighty-one miles and three fourths, only five miles longer than the travelled turnpike road. From Vine and Broad streets, to the foot of the Schuylkill inclined plane, the distance is two miles and two thirds. The foot of the plane is forty-seven feet nine inches above mean high tide, and the rail-way runs nearly on that level, from Philadelphia to the plane.

The Schuylkill plane is two thousand seven hundred and fourteen feet long, and its elevation from foot to head, is one hundred and eighty-five feet. From the foot of this plane, the rail way bed has been completed for a distance of twenty miles and one quarter. The succeeding thirty-six miles and a half have been located, but

have not been placed under contract. The next twenty miles and one third, of the road way, has been finished, reaching to the head of the plane at Columbia. From this point to the canal basin (a distance of one mile and one fourth,) the road way has not been placed under contract. The plane at Columbia, is one thousand nine hundred and fourteen feet in length, and has an elevation from foot to head, of ninety feet. The surface line, in the canal basin at Columbia, is two hundred and thirty-seven feet and twenty seven hundredths above mean high tide, in the Schuylkill, at Fairmount. The top water line in the basin, at Columbia, is nineteen feet four inches above low water mark, in the Susquehanna, at the abutment of the bridge over that river. At the head of the inclined plane, at the Schuylkill, it is intended to station a steam engine of from forty to fifty horse power; and one of the same force at the head of the plane at Columbia. The engine at Columbia, will be of sufficient strength to elevate eight hundred tons from the foot to head of the plane, in the day of eleven hours.

As the amount of tonnage going eastward, will greatly exceed that going west, the engine at the Schuylkill, though acting on a longer plane, and one of greater elevation than that at Columbia, will still be able to forward the tonnage to any extent that can be offered.

The line of location of this rail way, seems unparalleled for its facilities and advantages.

The highest point on the line, is at the Gap of Mine Ridge, thirty miles from the basin, at Columbia. By a cut of thirty-one feet and one fourth, for a short distance, this is reduced to five hundred and sixty feet above mean high tide to three hundred twenty-seven feet and one fourth above the head of the plane, at the Schuylkill, and to two hundred and thirty-three feet above that at Columbia.

Although the cutting on the location, is generally light, except at the Gap mentioned, yet the elevation will not, on any part of the distance between the head of the plane at the Schuylkill and the head of the plane at Columbia, a space of seventy-seven miles, exceed thirty feet to the mile, in either direction, being less than one third of a degree.

Even on the Liverpool and Manchester rail way, though but thirty-two miles in length, and recently constructed in the most costly and admirable style, under the patronage of the commercial and manufacturing wealth and power of England, upwards of one and a half miles of the road, has unavoidably a graduation of fifty-five feet in the mile. It is found however, in practise on this road, that locomotive engines, which draw forward twenty tons, at the rate of nineteen miles per hour, on a level, can proceed at the rate of seven miles per hour, at this elevation of fifty-five feet to the mile. There can be no doubt, but that a locomotive engine of sixteen horse power, weighing five tons, will draw thirty tons, and twelve waggons, at the rate of six miles per hour, up an elevation, not exceeding a grade of thirty feet per mile, without fear of this

weight causing the engine wheels to slide on the plane, or to have only a rotary motion (of the wheels) without a progressive motion along the plane.

In practice, it will be found, that a locomotive engine, with thirty tons of coal or other loading attached, will be able to travel the whole distance, from Columbia to Philadelphia, in a day of ten hours. The rise in the direction of the greatest trade, viz: from the head of the plane at Columbia, to the summit of Mine Gap Ridge, is but two hundred and thirty-three feet; the rest of the distance is nearly level, or descending. A good Pennsylvania wagon horse, will, on this rail-way, convey ten tons a distance of twenty-seven miles per day, with ease.

The country through which the Columbia and Philadelphia rail-way runs, is the most highly cultivated, populous and wealthy part of the state. Through it for many years a large amount of produce floated down the Susquehanna to Columbia, has found its way to Philadelphia.

So considerable has been the travel and transportation on this road from Columbia to Philadelphia, that thirty-five years ago, the inhabitants of Lancaster and Chester counties, with a view to a more easy transportation, undertook the then Herculean labor of making a turnpike road from Lancaster to Philadelphia; by their steady perseverance and solid wealth, they accomplished this heavy task, and made the public their debtors for the example of the first turnpike constructed in the Union.

The spirit of improvement still visits these favored counties and notwithstanding some opposition, will lead their inhabitants to encourage and adopt amongst them one of the most useful and splendid attainments of the present day. The county of Lancaster gave to the WORLD the citizen who first taught the power of steam so beneficially to propel "the vast barge." Its inhabitants will sustain an improvement, along which the same power may as beneficially "whirl the rapid car."

The utility of rail-ways and the advantages of the locomotive engine are no longer matters of experiment or doubt with those who have seen their operations. But as few of our citizens have had such opportunities, it is of general advantage that the first rail-way commenced by the state is located so immediately in the line of travel in Pennsylvania, that thousands of our citizens from various parts of the commonwealth, upon its completion, must unavoidably witness such demonstrations as will satisfy every beholder. The citizens between Columbia and Philadelphia are not alone interested in the completion of this rail-way; as evidences of the advantages of structure will there be established of high interest to every part of the state, not accessible by canals; and when proved to be useful, then by public or private funds, rail ways can be extended in every beneficial or profitable direction, and thus other portions of the state than those now embraced within the range of improvement may equally share the public favor.

The benefits of a rail-way from Columbia to Philadelphia must

be especially felt by the inhabitants, not only by cheapening transportation from their homes, but for a wide extent on each side of the rail-way, by furnishing coal, timber, boards, &c. from distant places, at a cheap rate, to settlements where the agricultural products of each acre are too valuable to admit of being reserved as woodland. The completion of the canal to the exhaustless beds of prime coal in the Wyoming Valley, will insure supplies to any extent; and within one year after the rail-way is finished, coal will be sold at less than three dollars and fifty cents per ton throughout the whole of its course. By means of the rail-way, Lancaster and Chester counties will also have the benefit of being embraced in the great line of communication for the trade between Philadelphia and Pittsburg; between the commercial metropolis of the state and the mart for the reception and distribution of the trade of the extensive west, a trade which even now keeps eight hundred wagons in steady employ.

The business on this road, when the whole communication is arranged with the navigable western waters and with the productive northern regions of our own state, will, within the first year, astonish the most sanguine.

The original cost for grading, bridging and preparing the bed of the rail-way from Columbia to Philadelphia, made in 1828, was four hundred and sixty-two thousand four hundred and forty one dollars and seventy seven cents.

The following statement shews the principal works on forty miles and a half of the road bed and their actual cost. The road-way is twenty-two feet wide, and has been arranged with a view to a double track.

Cost of excavating, embanking, &c. forty miles and a half,	\$164,441 10
10 road and farm bridges, across the rail way, Stone abutments, superstructure of wood, span from thirty-one to fifty-four feet.	13,217 53
12 bridges—forming five hundred and ten feet of the line of the rail-way, principally stone arches,	9,401 28½
5 bridges—forming three thousand five hundred and seventy-eight feet of the line of the rail- way,	63,735 29
25 stone culverts—whose span, one hundred and twenty-eight feet,	8,406 49
70 miles of fencing,	32,592 71
For repairing and protecting embankments,	3,528 64
Incidental expenses,	1,272 55½
Engineer, superintendents, &c.	21,500 00
Additional amount required to pay engineers, su- perintendents, and contingent expenses,	2,000 00
Amount paid as damages,	525 29
	<hr/>
	\$320,629 89

From this amount should be deducted \$38,874 75, being the value of 57,000 cubic yards of stone, obtained in the excavation of the sections, and which will be of that value in the construction of the rail-way. Its excavation cost \$31,536 36, at the contract prices.

The following statement will shew the additional cost for completing the work.

For grading, bridges, &c. including superintendence and all charges, forty-one miles and one fourth of rail-way bed, in addition to what has been done,	\$320,000 00
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For laying a single track-way, on eighty-one miles and three fourths, on the best plan, and in the best manner, at \$5,500 per mile,	449,625 00
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2 steam engines, of forty-five horse power, each, with buildings, ropes, &c.	15,000 00
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	\$784,625 00
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If a double tract be laid, add	449,625 00
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	\$1,234,250 00
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The grading, bridging and forming the rail-way bed throughout the whole line, from Columbia to Philadelphia, can be completed in the year 1831, and forty miles of the rail-way can be laid for use by the 1st of June, 1832; the remainder by December, of the same year.

The mechanical and other work on this division, appear to be executed in the best style.

The largest bridge on the line of the rail way, is that over the Conestogo, near Lancaster. It is built on Town's lattice plan, is fourteen hundred feet long, has twenty-two feet width of platform. Its abutments and piers are composed of excellent rubble masonry laid in mortar. There are ten piers; the highest of these is sixty feet. In the piers and abutments, there are eight thousand three hundred and twelve perches of masonry. The materials in the superstructure are all prime, and the work does credit to the contractors. The bridge is of great strength, it is roofed and weather boarded. The whole cost of this work was only thirty-one thousand, six hundred and fifty-two dollars.

An arch bridge has been built over Little Conestogo, on Barr's plan. This work has been faithfully constructed, and is a beautiful specimen of bridge architecture. The bridge is eight hundred and four feet long, contains three thousand, three hundred and twenty-six perches of masonry, is roofed and weather boarded, yet the cost when completed, was but fifteen thousand three hundred and fifty-nine dollars. The highest pier in this bridge is forty-seven feet. There are five piers.

The eastern division of the Pennsylvania canal, commences at the point of connexion of the Pennsylvania rail-way, with the canal basin at Columbia, and runs through the counties of Lancaster and Dauphin, along the eastern side of the Susquehanna river, to a point opposite Duncan's island; then crosses the Susquehanna by a towing path bridge, and terminates at the outlet lock of the Susquehanna division, at Duncan's island. The whole length of this division, by the towing path, from the foot of the basin at Columbia, to the outlet lock at the island, is forty-two miles and eighty-five hundredths of a mile.

About thirty five miles of the division passes through a country highly favourable for the construction of a canal. The river bottoms are wide, and admit of the adoption of any level desired. The excavation in general is easy, and the materials for banks good. About eight miles may be termed difficult, and part of it, judging by the expense, extremely so. Three hundred and fifty-one thousand dollars, were expended in constructing about three miles and a half of the prism of the canal, exclusive of mechanical and other work.

The width of the canal on this division is twenty-eight feet at bottom—forty feet at top water line—the depth four feet.

The top water line of the basin, in which the Pennsylvania and Union canals unite, at Middletown, is fifty-two feet and a half above that of the basin at Columbia, and two hundred and ninety feet above tide. The top water of the large basin at Harrisburg is three hundred and twelve feet, and the surface line of the pool around Duncan's Island, three hundred and thirty-two feet, respectively, above tide. The floor of the vestibule of the state capitol is three hundred and sixty feet above tide.

The twenty-four miles of this division, lying between the Swatara and Duncan's Island, was the first line of state canal placed under contract, and has been for some time in navigable use.

On these twenty-four miles there are six lift locks on the main line. One lock of three feet, leading from the main line to the basin at Middletown, and two locks leading from said basin into the Swatara river, having each nine feet lift.

The original estimated cost of these twenty-four miles, made in 1826, was four hundred and five thousand five hundred and eleven dollars. The first contracts are dated in June, 1826. The ground was broken July 4th, 1826.

It is now ascertained that the whole cost of these twenty-four miles, inclusive of damages, has been eight hundred and thirty-two thousand and thirty-six dollars and sixteen cents.

The following statement exhibits the principal works, and their cost.

Cost of constructing the sections,

Excavation and embankment, &c. in-

cluding a basin at Middletown, \$273,968 24

196,049 perches of vertical wall, 135,674 58

————— 407,642 62

4 $\frac{1}{2}$ miles of turnpike road on the whole division,	22,000 00
11 locks cost,	132,721 91

These locks are constructed of cut stone, and are seventeen feet in width and ninety feet in length, clear, in the chambers.

A feeder dam across the Susquehanna, at Duncan's Island.

The old dam consisted of a line of loose stone, extending across the stream, which, together with the sluice, and including six thousand and eighty-seven dollars and one cent and a half, paid in repairing, cost,	29,799 16
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The new dam is one thousand nine hundred and ninety-eight feet long, between the sluice wall and the abutment on Duncan's Island. The dam is eight feet and a half high, from the bed of the river. It has a base of thirty feet, and is composed of strong timbers, cribbed together and filled with thirteen thousand perches of stone, well packed, and covered with large timbers, thirty-five feet long. The upper end of the timbers are covered with stone four feet above the foundation. This work cost,	18,421 60
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The stone of the old dam were used for filling and covering.

The western abutment contains six hundred and ninety-eight perches of masonry, laid in mortar, and together with its guard bank, cost,	2,750 50
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This dam was completed for use in eighty-five days from the day of contract.

4 aqueducts—the longest one hundred and twelve feet, the shortest eighty-one feet; the whole length between the abutments is three hundred and seventy-three feet, width from eighteen to twenty feet,	43,724 09
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The piers and abutments of cut stone and rubble masonry, the superstructure partly stone and partly wood.

12 culverts, stone, whole span sixty eight feet,	14,641 51
6 waste wiers, whole overfall two hundred and fifty-one feet,	2,716 37

5 water ways,	1,250 00
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7 lock houses,	2,997 69
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13 road and 34 farm bridges, stone abutments, superstructure wood,	41,915 03
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1 basin at Harrisburg, of three acres and a half	3,699 35
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The fencing cost about	14,000 00
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Incidental expenses of the whole division,	2,193 19
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Engineers, superintendents, &c. of the whole division,	33,193 19
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Repairs to the 10th of June 1830,	27,212 44
Miscellaneous, on the whole division,	18,731 97½
Damages paid on the whole division,	12,425 54

\$832,036 16½

Of the remaining eighteen miles and seven-eighths of this division, ten miles were authorized to be placed under contract, and the most difficult parts were selected. The original estimated cost of the ten miles placed under contract, made in 1828, was two hundred and forty thousand eight hundred and fifty-five dollars. These ten miles are nearly completed.

The works and cost, when finished, will be as follows:

Sections—Excavation and embankment \$ 185,068 97

One hundred thirty-eight thousand
four hundred and eighty-six perches
of vertical wall, 135,989 63

Forty four thousand nine hundred and
fifty-eight perches of rip rap wall,
for foundation, and five thousand
one hundred and ninety yards of
inside wall, 22,619 15

6 lift locks, \$ 343,677 75

3 aqueducts—whole length two hundred and sev- 30,812 00

enty feet, width, from twenty to twenty-eight
feet, 7,991 40

4 culverts of stone—whole span twenty-eight feet, 2,136 75

2 waste wiers—whole overfall one hundred feet, 700 00

6 water ways, 4,200 00

6 lock houses, 1,800 00

Bridges—three road and five farm, 5,458 49

1 basin at Columbia, say 3,000 00

1 culvert at Haldeman's mill, 1,200 00

Fencing, about 2,277 23

Add for expenses, 2,211 74

Amount of work not yet included in final reports, 46,232 04

Cost of twenty-four miles above Middletown, 451,697 30

832,036 16

\$1,283,733 46

The eight miles and seven eighths, not under contract, will require the following works, viz:

Sections—Excavation, embankment, &c. \$ 54,000 00

Aqueduct over the Swatara, two hundred and fifty
feet from abutment to abutment, 25,000 00

Stone abutments and piers, and superstructure of
wood.

2 locks of eight feet lift each; 2 lock houses,	13,400 00
4 culverts, whole span twenty-four feet,	1,300 00
8 waste wiers and 2 water ways,	1,550 00
19 bridges,	8,560 00
12 miles of fencing, at three hundred and sixty dollars per mile;	4,320 00
Engineers, superintendents, &c.	3,000 000
Add contingencies,	5,000 00
	<hr/>
	\$ 116,170 00
	<hr/>

The whole work is remarkably easy of construction, and if authorized by the 1st of March, can be finished for use by the first of September next, at an expense, including superintendence, and all other changes, not exceeding one hundred and sixteen thousand dollars. Fifteen lock-keepers required on the whole division.

THE SCHUYLKILL CANAL

Belongs to an incorporated company. It commences at Fairmount, near Philadelphia, and runs to Port Carbon, in Schuylkill county.

The distance from tide to the point at which the Union canal commences is sixty miles. The rise or lockage to the said point is one hundred and eighty-two feet and one fourth, from mean high tide in the Schuylkill. On this part of the canal there are thirty-four lift, guard and outlet locks. This canal leads to the coal beds in Schuylkill county. It is one hundred and ten miles in length, was the first canal carried into successful operation in the state, and does credit to the enterprize and public spirit of the stockholders. It has cost about two millions of dollars.

THE UNION CANAL

Is the property of an incorporated company. It commences in the Schuylkill canal near Flying Hill Run, extends to Middletown, and connects with the Pennsylvania canal in a basin at that place. The whole length of this canal is eighty miles. The rise or lockage from the point of separation from the Schuylkill canal to the summit level is three hundred feet. The fall to the topwater in the basin at Middletown is one hundred and ninety-two feet and an half. On this canal there are ninety-two lift and two guard locks.

Through these canals and the Pennsylvania canal a communication is now established from Philadelphia to Wilkesbarre, and also to Huntingdon.

A very considerable increase of business will shortly take place on these canals, in consequence of the completion of a material part of the Pennsylvania canal, with which these connect.

The great expenditures which the Schuylkill and Union canal companies have made has effected much for the benefit of the public, and in all reasonable matters they are entitled to public protection and favorable consideration.

These canals are here brought into view from their close connection with the eastern division of the Pennsylvania canal; and

from the fact of their forming a part of an entire line of communication from Philadelphia to Huntingdon, and from Philadelphia with the canal along the Susquehanna and its branches.

JUNIATA DIVISION.

From the outlet lock at the end of the eastern division, to the point on Duncan's island at which the Juniata division commences, the distance is one mile and fifty-eight hundredths of a mile. The rise from the surface line of the pool in the Susquehanna at the outlet to the topwater line at the commencement of the Juniata division, is twenty feet nine inches. This portion of the canal forms part of the Susquehanna division.

The Juniata division commences on Duncan's island in the county of Dauphin, and runs through the counties of Perry, Mifflin and Huntingdon, to a point one fourth of a mile above the town of Huntingdon. The whole length of the division, by the towing path, is eighty-nine miles. The topwater line at the connexion of the Juniata and Susquehanna divisions, on Duncan's island, is three hundred fifty-two feet and a half above mean high tide at Philadelphia.

Compared with other divisions, a considerable part of this may be classed as difficult. The entire course of the Juniata river lies through a mountainous country. The mountains are of great elevation, their sides steep and rocky; in some cases extending for many miles parallel with the stream; in others their general range intersects the stream, leaving merely a gap for its passage. The margin betwixt the mountains and river is in many places extremely contracted. The banks of the Juniata are generally bold, and are as well calculated for a slack water navigation as any river of the state.

About fifty-four miles of the division, may be considered as offering the ordinary facilities, twenty miles as difficult, and fifteen miles as very difficult.

The width of the canal, on the Juniata, is twenty-eight feet at bottom, forty feet at top water line, and it has four feet of depth. In its course there are thirty-five lift locks, three guard locks, one out-let and four river locks. The lift locks are fifteen feet by ninety feet clear in the chambers. The lockage or rise from canal top water, at the point of separation of the Juniata and Susquehanna divisions, to the top water of the level above Huntingdon, is two hundred and fifty-one feet and a half. The top water of the canal at Huntingdon, is six hundred four feet and three inches above tide.

The original estimates for constructing this division, were seventeen hundred and forty-one thousand five hundred and eight dollars. The first contracts were made in August, 1827.

It is now ascertained that the actual cost of the division, including thirteen thousand five hundred and sixty four dollars, paid as damages to property, will be two millions four hundred and ninety thousand two hundred and ninety dollars.

The following is an exhibit of the principal works and their cost:
 Cost of constructing the sections, excavation, embankment, &c., from

Duncan's island to Lewistown,	\$ 686,928 40½
From Lewistown to Huntingdon,	846,708 54½
	<hr/> 1,533,636 95
1 out-let lock at Lewistown, constructed of wood,	7,542 79
1 guard lock at North's island, of wood,	3,985 00
1 guard lock at Raystown,	8,230 14½
1 guard lock at Aughwick falls,	13,157 14
35 lift locks—Of these, three are constructed of cut stone, five of rubble masonry, one combined with a stone aqueduct, and twenty-six constructed of rubble masonry, laid in mortar, on timber bottom with longitudinal sills and upright posts, faced with plank spiked to the timbers,	203,246 78
4 dams—The whole length between their abutments is about two thousand two hundred and fifty feet, height from eight to nine feet. Their cost, including four river locks, and one schute and sluices,	90,870 91
Pier heads,	7,804 14
19 aqueducts—Their whole length is twenty-eight hundred and ninety-seven feet; the longest six hundred feet, the shortest twenty-six feet, width generally eighteen feet, stone abutments and piers, superstructure of wood,	245,351 04
One of these aqueducts built over Buffaloe creek, is formed of cast iron, covered with iron plates and floored with cut stone, laid in cement.	
25 waste wiers,	13,453 34
60 culverts—Whole span, three hundred and forty-six feet, rubble masonry in mortar,	61,799 16½
39 road, 63 farm, and 5 towing path bridges, exclusive of embankment,	40,436 53
Roads—Seven miles and a half of turnpike, and fourteen miles and three fourths of township roads,	60,745 18½
Fences—At eighty cents per panel of ten feet,	21,397 71
29 lock houses,	20,371 64
Castings,	3,879 58
Rope ferry,	8,086 79½
Repairs,	69,355 18½
Contingent expenses—Target, levels, rent, &c.	3,880 60½
Engineering,	51,388 25
Superintendents, &c.	8,107 00
Damages paid,	13,564 31½
	<hr/>
	\$2,490,290 13½

30 lock keepers required.

That part of the division above Lewistown, into which the water has been recently admitted, proves to be excellent canal.

The proposed canal and slack water, along the Juniata, above Huntingdon, may extend from the head of the canal at that town, to the head of the basin at Hollidaysburg, as arranged by Moncure Robinson. The whole length of the division, will be thirty-nine miles; all within the county of Huntingdon.

A considerable part of the country through which this division must pass, partakes of the mountainous character of the lower Juniata. The river bottoms are contracted, the banks are high, bold and rocky; the stream narrow, its fall averages eight feet per mile.

It is obvious from this general character, that a great saving may be made by converting the most difficult parts of the line into a slack water navigation of the river bed, by means of high dams. These may be so arranged as to save many miles of canal, along the most difficult parts of the shore, and this will greatly diminish the general cost.

Should a canal be constructed only along parts of the division, where the ground is favorable, it is clear, that the proportion of excavation, embankment, &c. will be much less than if a canal were extended through the whole line.

The dams may be so arranged, that no aqueducts will be required. A large saving will also be made by the diminished number of bridges, culverts, waste wiers, as also in the quantity of wall, fence, road, &c. It is obvious too, that the whole work can be completed in much less time than by constructing a canal through the whole line. Objections cannot be fairly made to the erection of these dams, as the river bed above Huntingdon, is but little used for navigation.

The communication by canal and slack water between Huntingdon and Hollidaysburg, can be completed by the 1st of May, 1832; provided the legislature authorize the work as early as the 1st of March, 1831.

The cost of the proposed slack water and canal communication, may be fairly estimated at \$546,000.

The whole rise and lockage from top water of the canal levels, at Huntingdon, to top water of the basin, at Hollidaysburg, is three hundred and twenty-three feet nine inches. The water surface of the basin, proposed at Hollidaysburg, is nine hundred and twenty-eight feet above mean high tide.

Having through the Schuylkill, Union and Pennsylvania canal, or by the Pennsylvania rail-way and canal reached Huntingdon, and passed along the course by which a water communication can be advantageously extended to Hollidaysburg, the Allegheny now presents its formidable outline.

Destined to separate the great waters of the east and west, this mountain bids defiance to all the efforts of art to connect the water navigation which has been so successfully arranged to its east-

tern and western base. Man it seems may disturb and modify the mere incidental arrangements of nature;—her mighty laws and works must still prevail. We are therefore, here forced to find some other means, by which to cross this great barrier, than that of a water communication.

Standing on the level of the water line of the basin at Hollidaysburg, nine hundred and twenty-eight feet above mean high tide, and two hundred and twenty-three feet below the level of the canal basin at Johnstown, on the opposite side of the Allegheny mountain, and looking in the direction of the head of the basin, at that place, a direct line strikes the comb of the mountain at Blair's Run Gap summit, three miles south of the present turnpike road. This summit is one thousand six hundred and sixty-nine feet above the level of the basin at Hollidaysburg. On the left of this summit are Bob's Creek Gap, one thousand five hundred and seventy-eight feet high; and farther to the left Cedar Swamp summit, one thousand five hundred and thirty-two feet high. On the right Laurel run summit, one thousand five hundred and eighty-seven feet. Adams' Run, one thousand five hundred and forty-nine feet. Blairs' Gap, one thousand four hundred and fourteen feet. Sugar Run, one thousand three hundred and sixty-five feet, respectively, above the basin at Hollidaysburg. The last mentioned summit is about one mile and a half north of the turnpike. The tunnel proposed by Moncure Robinson, is one mile north of the turnpike, one mile in length, and one thousand two hundred and sixty-four feet, and sixty hundredths of a foot above the basin at Hollidaysburg, and the comb of the mountain immediately over the tunnel, is one thousand four hundred and forty-one feet and sixty hundredths above said basin.

It appears, that, to pass the lowest depression of the mountain, within the range of the portage, one thousand three hundred and sixty-five feet of elevation must be overcome, on the eastern side, in about ten miles and a half to the crest; and that the descent from that point to the canal basin at Johnstown, is one thousand one hundred and forty-two feet. The distance about twenty-seven miles and a half.

To expedite and cheapen transportation across this portage, many plans have been proposed, and many surveys and examinations have been made. Time, discussion and reflection, have narrowed down these plans, until two only are admitted to be worthy of consideration; the one by means of a Macadamized turnpike; the other by a rail-way. It is satisfactory to know, that the mountain readily admits of the adoption of either plan.

Should a rail-way be deemed the most advisable, on account of the great expedition and cheaper rates at which transportation can be effected, the most eligible plan would seem to be that arranged with spaces of the road graded below one third of a degree, extending as far as conveniently practicable, and terminating with an inclined plane of about half a mile in length, rising at a grade not exceeding five degrees. A steam engine, of forty horse power,

to be stationed at the head of such plane, to draw up the loading, brought to its foot by horse or other power, and thus alternately until the whole elevation of the mountain is overcome. In this manner, nine or ten steam engines and a small number of horses, could pass five hundred tons from basin to basin, in each direction, in a day of eleven hours, at a very moderate expense.

The extensive demand for fuel, in the city of New York, and its high price, induced a number of enterprising citizens to attempt to arrange an advantageous communication, by which to transport coal from Carbondale, in Pennsylvania, to that populous city. After much labour and expense, success attended the enterprize.

This line of communication is by the Hudson river to Kingston, ninety miles; thence by a canal through the state of New York, to Honesdale, in Pennsylvania, one hundred and four miles; and from this point by a rail-way of sixteen miles, to the coal mines on the Lackawannock, in Luzerne county. The whole distance from New York city to Carbondale, is two hundred and ten miles.

In passing from the coal mines, at Carbondale, to the top of the mountain between that place and the head of the canal, it is necessary to overcome an elevation of eight hundred and fifty-five feet in four miles, and to descend nine hundred and thirteen feet to Honesdale. The greater part of this elevation, is overcome by five stationary engines, each acting at the head of an inclined plane, of about half a mile in length, and having an elevation of about one hundred and eighty-five feet to the half mile.

To satisfy themselves, as to the actual practical results of stationary steam power, acting on inclined planes, the members of the board, in the course of their travel, visited the rail-way at Carbondale, so that by their own personal inspection, they might know how far the proposed application of stationary steam power, connected with a system of inclined planes and levels, might be beneficially applied to overcome the great elevation of the Allegheny mountain, between the heads of the Pennsylvania canal.

The board wished also, to be enabled to judge of the practical results which might be expected, on the Susquehanna and Schuylkill planes, of the Columbia and Philadelphia rail-way.

At the time the commissioners visited the Carbondale rail-way, the mining operations of the coal company did not enable them to present for transportation, more than two hundred and fifty tons per day. This quantity, was daily conveyed across the mountain. The operations of the stationary engines, were carefully noted, and in the ordinary routine of business, it was observed, that seven tons and a half of coal contained in three cars, the whole weighing ten tons, was conveyed from foot to head of each plane, at an average of eight minutes, and that only eleven minutes elapsed from the time the machinery was attached to one train of cars, to the time these were passed on, and another train was attached. Consequently, the machinery was capable, by steady operation, (and machinery never tires) to pass, in the day of twelve

hours near five hundred tons of coal. The engines are thirty-five horse power, and the whole cost to the company, for each engine, including attendance, fuel, and all charges, is six dollars and forty-two cents per day.

The company by contract, and at a profit, convey merchandize across the sixteen miles for thirty-five cents per ton, exclusive of toll.

The whole elevation and descent, to be overcome on the Moosic mountain, between Carbondale and Honesdale, is one thousand seven hundred and sixty-eight feet, in a distance of sixteen miles. That from the basin at Hollidaysburg to Johnstown, taking the lowest depression of the mountain, is two thousand five hundred and seven feet in a distance of thirty-eight miles. The elevation of the Moosic mountain, is therefore, nearly equal to three fourths of that of the Allegheny, yet, the first named mountain is overcome, through the means and arrangements of merely an incorporated company; surely, then the most wealthy and powerful state of the Union, is competent to establish and maintain the arrangements necessary to overcome the difficulty on the Allegheny.

Should the legislature determine to adopt the plan of a rail-way across the Allegheny, dispensing with the tunnel, the cost may be fairly stated as follows:

For grading, bridging and finishing the rail-way bed, for a double track-way, including all expenses, say thirty-eight miles, at \$9 000 permile,	\$342,000 00
For a single track-way, at \$5,300 per mile, laid in the best manner, and including all expenses,	201,400 00
Steam engines, ropes, buildings, &c.	60,000 00
	<hr/>
	603,400 00
If an additional track be laid after the first is com- pleted, it will cost \$5,000 per mile,	190,000 00
	<hr/>
	<u>\$793,400 00</u>

Should it be determined to adopt a Macadamized turnpike, for the present, the road may be graded as has been herein proposed, and teams can be doubled on the planes, and a rail way can, at a subsequent period, be laid upon the bed of this road.

The report of Moncure Robinson in 1829, and of the engineers appointed under the act of 27th March last, is referred to for further information upon the subject of the portage.

The western division of the Pennsylvania canal will unite with the proposed portage, across the Allegheny mountain, at an extensive basin arranged at Johnstown. in the county of Cambria, with a view to such connexion. The head of the division is at the basin mentioned, from whence the canal runs through the counties of Cambria, Indiana, Westmoreland, Armstrong, Butler and Allegheny, and terminates in the Monongahela river at Pittsburg.

A branch terminates in the Allegheny river, at the town of Allegheny.

A very considerable part of this division presents difficulties in the construction of a canal, especially between Johnstown and Blairsville. The sides of the gaps through the Laurel Mountain and Chesnut Ridge are rocky, precipitous and of great elevation; a passage is barely afforded to the stream. The river hills through the whole extent of the canal are high, steep and liable to slip.

About sixty-four miles of the division may be classed as affording the ordinary facilities for the construction of canal, twenty miles as difficult, and twenty miles as very difficult. Ten miles of the very difficult lies above, and ten miles below Blairsville.

The Conemaugh and Kiskiminitas throughout their whole course from Johnstown to the Allegheny river, a distance of seventy-four miles, are narrow streams, with high, steep banks, well adapted for slack water navigation. There is on the division about twenty-seven miles of slack water, and it would have been advantageous, had the proportion to that of canal been greater.

On the thirty miles of canal between Johnstown and Blairsville, the average fall of the river is upwards of eight feet per mile, requiring equal to one lock per mile. Below Blairsville to the Monongahela, the fall is but three feet per mile, requiring equal one lock to two miles and a half.

The law of 1823, authorizing the commencement of the western division of the Pennsylvania canal, directed the construction of the canal "from Pittsburg to the mouth of the Kiskiminitas," both of which points are on the east side of the Allegheny river. It is evident that a great error was committed in locating the canal on the western side of the Allegheny, as the navigation of the canal is necessarily dependent on the permanency of the aqueducts across that river. These aqueducts are of feeble construction and their arches of great span.

On the commissioners visiting and inspecting the older part of the division between Blairsville and Pittsburg, it was obvious to them all, that extensive repairs, to remedy the original defects of the work, were necessary, before a secure navigation could be expected; and it was concluded that it was better to interrupt the navigation during the present year than afterwards.

The commissioners, therefore, passed the following resolution:

"Resolved unanimously, as the board are convinced by personal inspection of the western division of the Pennsylvania canal, that immediate and extensive alterations and repairs of the canal between Blairsville and Pittsburg are necessary, to correct the errors of its original construction, and to secure the works and enable the canal to bear the depth of water contemplated at its commencement: that the supervisors on their respective portions of said line, be and they are hereby directed to draw off the water from the canal on Monday the 16th day of August next, and that they take immediate measures to make, with all practicable expedition, such repairs, &c. of the canal, locks, dams, culverts, aqueducts, &c. as

by the engineer, on the western division, shall be designated as necessary to the security and complete navigation of said line, and as he may think it practicable to effect, so as to again admit the water into the canal by the 20th day of October next."

The agents on the division acted with great energy, and within the time prescribed, effected the most essential repairs. Several of the locks have been rebuilt entire, and others partially so, several culverts have been rebuilt, the aqueducts have been repaired and strengthened, the dams, &c. have also been repaired, and it is hoped rendered secure. The commissioners are satisfied that all was effected that it was possible to effect within the time allowed.

The sum expended in making the necessary repairs has been considerable, but the amount is moderate, when the extent of work done is taken into view. The part of this division repaired is now in good navigable order.

The act of 28th March, 1830, authorized the construction of that part of the western division leading from section No. 57, of the Ligonier line, to a suitable point for the connexion of the portage road and the canal at Johnstown. The distance from the head of the basin, at Johnstown, to section No. 57, of the Ligonier line, is three miles and a half.

The estimated cost of this work, made by Sylvester Welsh, the principal engineer on the division, in April, 1830, was seventy thousand one hundred dollars.

The actual cost completed, is sixty four thousand two hundred and fifty five dollars.

The following are the principal works, and their cost:

Sections—including two thousand and eighty-nine perches of wall,	\$18,192 31
1 basin, of eight acres and a half, and a towing path of one thousand four hundred and seventy feet,	1,693 28
3 locks, of cut stone masonry, laid in hydraulic cement, Built in the best style, and including lock sections.	13,751 85
1 aqueduct—length of trunk forty-five feet, width eighteen feet, stone abutments, superstructure wood,	\$,720 00
1 aqueduct over the Conemaugh river—two spans, length of trunk one hundred and sixty-three feet, width seventeen feet. Piers and abutments contain one thousand eight hundred and eighty-five perches of cut stone masonry, laid in cement—also, one hundred and sixty one thousand feet, board measure, of timber, and six thousand five hundred pounds of iron; the structure is roofed and weather-boarded,	13,050 00
5 culverts, whole span twenty feet,	2,660 00
2 waste wiers, one hundred feet,	360 00

1 dam across the Conemaugh, one hundred and forty feet long, six feet high, stone abutments, crib work, filled with stone and sheeted,	1,219 00
1 guard bank, four hundred and five feet long, top twelve feet wide and seventeen feet and a half above the bottom of the canal,	537 00
1 water way forty-three feet long, thirteen feet high, four gates—one hundred and forty-one perches of masonry,	\$ 1,158 45½
3 lock houses,	1,165 00
Fencing required,	805 00
Roads,	282 00
1 dam and waste wier connected, one hundred feet long and eleven feet high,	1,539 34
2 road and one farm bridges—fifty feet span and eighteen feet wide—stone abutments, superstructure of wood, trussed with iron,	2,240 00
3 water ways around locks,	1,245 46
Add proportion of expenses of engineers, superintendent's pay, and all other charges, for ten months,	630 24
	<hr/> <hr/> \$ 64,255 00

The work was completed and navigated within seven months of the day of first letting and contract.

The work on that part of the Ligonier line, extending from section No. 57, to Blairsville, about twenty-six miles and a half in length, was commenced in the beginning of the year 1829.

The original estimated cost, made in November, 1828, for this part of the line, and subsequent to the letting in the fall of 1828, was four hundred and fifty-two thousand five hundred and seventy eight dollars and thirty-one cents. The estimate made by Mr. Welsh on his becoming principal engineer in 1829, and reported in November of that year, was six hundred and forty-one thousand seven hundred and thirty-two dollars and seventeen cents.

The actual cost of this part of the line, completed, will be six hundred and forty-four thousand one hundred and seventy-eight dollars and seventy-four cents.

The following is a statement of the principal works on this part of the line, and their respective costs:

Sections—excavation, embankment, &c.	\$ 242,398 49
Slope walls, not included in the cost of sections,	5,897 14
Lock sections, guard and lift,	14,228 07½
4 guard locks, } Cut stone, laid in cement,	{ 26,802 98
27 lift locks, }	{ 161,798 19

Aqueducts—One of seventy five feet in length and nineteen feet in width, constructed of cut stone, arches, abutments and piers,		\$ 13,184 00
One at Laurel Run, forty-five feet long, eighteen feet wide, stone abutments, superstructure of wood, trussed with iron,	3,925 00	
One at Lockport, cut stone abutments, piers, arches and trunk. In the work there are five arches and contains eight thousand six hundred perches of masonry in mortar—whole length three hundred and eighty-three feet, width of trunk nineteen feet,	57,100 00	
		<hr/> 74,209 00
4 dams—whole length one thousand five hundred and sixty-seven feet, whole height fifty nine feet and a half, crib work filled with stone, covered with timber and gravelled,	39,187 45	
Dam abutments of stone masonry,	8,660 21	
4 dam sections,	4,122 87	
Pier heads,	3,634 45	
		<hr/> 55,604 98
27 water ways or sluices, around locks,		8,201 74
8 culverts—stone masonry laid in cement, built in the best style and carefully secured, whole span about seventy feet,		9,112 20
11 waste wiers, entire span about five hundred and eighty feet,		5,733 55
28 lock houses,		10,663 00
Fencing,		3,429 93
Roads,		727 33
Puddling, not included in other contracts,		2,308 30½
Bridges—twelve road, eleven farm and six towing-path bridges. The road bridges have stone abutments, the superstructures strong truss-work, and extending the full width of the canal.		11,063 83
Contingencies—superintendence, engineers, stationary, &c.		12,000 00
		<hr/> <hr/> \$ 644,178 74

The new line from Blairsville to Johnstown was so far completed that it was opened for navigation in the month of November, to within a few miles of Johnstown. The water has been admitted.

from the head of the basin through the three miles and a half of canal, authorized the 28th of March last, and placed under contract the 10th of May. Having been completed for regular navigation within seven months from the day of contract, although an unusually large proportion of mechanical work was necessary on the line. Packet boats passed up to Johnstown and returned on the 10th of December. The whole line proves to be excellent canal; not one breach has occurred since it was filled for navigation. The report of the engineers and superintendent on the division are referred to for details.

That part of the western division which extends from Blairsville to the Allegheny river, was estimated in November, 1827, to cost four hundred seventy four thousand seven hundred dollars. The actual cost, completed, exclusive of repairs, made since the first of June last, will be one million fifty-five thousand four hundred eighty three dollars and ninety-seven cents.

The original estimates of the cost of that part of the division from the mouth of the Kiskiminitas to Pittsburg, taking the course the canal runs and including two aqueducts over the Allegheny and the line extending through Pittsburg to Monongahela river and the branch to the town of Allegheny, was five hundred and twenty three thousand seven hundred and ninety-six dollars and eighty cents. The actual cost, completed, exclusive of repairs made since the first of June last, will amount to nine hundred and ninety-five thousand dollars.

The original estimates for the whole western division amounted to fourteen hundred and ninety-eight thousand nine hundred and ten dollars and ten cents. The actual cost, completed, will be, including repairs to the last day of the present year, about two millions eight hundred thousand dollars.

THE SUSQUEHANNA DIVISION.

Commences at the termination of the eastern division, at the outlet lock at Duncan's island, and runs along the west side of the Susquehanna river, through the counties of Perry, Mifflin, and Union, and terminates at the south end of the towing path bridge at Northumberland. The whole length of the division, measured by the towing path bank, is thirty-nine miles.

The country through which this canal passes is favorable for a canal. The bottoms are wide and gently sloping to the river, giving the choice of level; few obstacles present themselves. The excavation is easy and material for banks good. Not more than four miles of the division presents any difficulties, and these not great.

The original estimate for constructing this division, was five hundred and ninety-eight thousand three hundred and seventy-six dollars and thirty-two cents.

It is now ascertained that the actual cost of this division, is one million thirty-nine thousand two hundred and fifty-six dollars and seventy-seven cents, inclusive of the bridge over the Susquehanna river.

The canal is in navigable order.

The whole amount of lockage on this division, from the surface line of the pool round Duncan's island, to the surface line of the pool at Northumberland, is eighty-six feet and a half. The surface of the pool at Northumberland, is four hundred and eighteen feet above tide.

Cost of constructing the sections, excavation, embankment, &c.

		\$545,232 41
Wall,		7,897 93
11 locks,		107,398 43
Dam at Shamokin—first cost,	\$21,434 08	
Repairs,	28,385 73	
Schute,	11,437 46	
Extending the schute,	2,960 00	
		<hr/> 64,217 27
3 aqueducts,		15,443 76
15 waste wiers,		2,464 94
26 culverts,		18,814 92
Road and farm bridges,		89,505 88
Towing path bridge over Susquehanna at Duncan's island, which was built under the superintendent of the Susquehanna division,		\$73,454 85
Ice breakers above said towing path bridge,		2,050 90
Roads,		3,962 03
Fences,		16,515 46
10 lock houses,		7,422 70
Dam at Snyder's mill, on Penns creek,		3,194 62
Ditto, on section No. 26,		532 80
Feeders,		9,121 04
Mound,		18,993 51
Basin and lock, on section No. 1,		4,599 32
Repairs,		1,085 54
Contingent expenses, paid attorney's fees,		300 00
Damages paid,		1,437 50
Miscellaneous expenses,		19,784 27½
Engineers, superintendents, &c.		31,027 18
		<hr/> <hr/> \$1,039,256 77½

THE WEST BRANCH DIVISION,

Of the Pennsylvania canal, commences at the south end of the towing path bridge across the western arm of the Susquehanna, at Northumberland, and runs along the east side of the stream, through the county of Northumberland, to the feeder dam at Muncy Hill, a distance of twenty-three miles and one quarter. The towing path extends along the pool some distance farther, making the whole length of navigation, twenty-four miles and a half.

No part of this division can be classed as difficult. The river bottoms are very wide, their slopes gradual, the lands generally cleared, very little rock is met with. The soil is sandy loam and

gravel, of course the excavation easy, the lockage is very inconsiderable.

The width of the canal at bottom, is twenty-eight feet, forty feet at top water line, the depth four feet. In its course there are six lift locks, and one guard lock, all constructed of wood and stone, they are seventeen feet wide, by ninety feet long, clear, in the chambers. Seven lock-keepers will be necessary.

The whole rise and lockage from the surface line of the Shamokin pool, at Northumberland, to the surface line of the pool, at Muncy, is forty-one feet. The comb of Muncy dam is one foot above canal level at the guard lock, and nine feet above low water in the river below the dam. The pool extends above two miles.

The original estimated cost for the construction of this branch of the canal, made in August 1823, was one hundred and ninety-seven thousand, eight hundred and fifty-one dollars.

The canal was filled for navigation in November, 1830.

The actual cost of this division, excluding damages to land, is now found to be four hundred and twenty one thousand, seven hundred and seventy-one dollars.

The following is a statement of the principal works, and their cost:

Sections, including excavation, embankments, &c.	
and 33,464 perches of wall,	\$188,827 53
Towing path round Muncy hill,	15,369 06
Slope walls at locks, &c.	1,957 27
7 lift locks, one guard lock and iron wicket gates,	38,506 00
The locks are constructed of wood and stone, dry walls of rough stone, are laid and planked in the bottom and sides, to timber, secure to the walls by iron bolts.	
Cost of the feeder dam across the Susquehanna, at Muncy ripples,	23,578 64
The dam at Muncy, constructed of crib work, filled with stone, covered with spars, the space between the stone abutments is nine hundred and seventy-three feet, the wier of the dam is eight hundred and sixty-three feet, the schute thirty-eight feet, the height of the comb of the dam is nine feet, and the comb of the schute five feet above low water mark of the river.—The dam is twelve feet high from the bottom of the river.	
1 aqueduct over Chillisquaque creek. Length between the abutments, one hundred and sixty feet, abutment and piers rubble masonry, superstructure wood, cost	5,086 36
13 culverts, constructed of stone, whole span eighty-six feet,	15,520 45
5 waste wiers, whole overfall two hundred and fifty feet, cost	1,947 00

6 lock houses,	1,980 00
Basin at Northumberland, cost	1,854 40
Paid for making roads,	2,113 62
Towing path bridge at Northumberland—length between abutments, one thousand two hundred and ninety feet, stone abutments and piers, superstructure wood, cost	57,490 51
35 farm and 14 road bridges, cost	25,984 28
33 miles of fencing,	10,928 41
Repairs,	4,886 65
Contingent expenses,	2,945 38
Engineers,	15,553 25
Superintendents, clerks, &c.	5,265 90
Real estate,	575 00
Damages paid,	1,401 44
	<hr/>
	8421,771 00

THE NORTH BRANCH DIVISION

Of the Pennsylvania canal, commences at the canal basin, in the town of Northumberland, and runs a northeasterly course, along the northern bank of the Susquehanna, through the counties of Northumberland, Columbia and Luzerne, to the entrance of the Wyoming valley.

The whole length of the division, from the point at which it intersects the west branch, in the basin at Northumberland, measured by the towing path bank to the feeder dam, at Nanticoke falls, is fifty-five miles and a half.

The country through which this division is formed, is generally highly favorable for the construction of the canal. Not more than eight miles can be classed as difficult. The river bottoms are generally wide, and the excavation easy. The material for banks good.

The width of the canal, at bottom, is twenty-eight feet, water line forty feet, depth of water four feet. In its course, there are seven lift and one guard locks, constructed of wood, width seventeen feet, length ninety feet, clear, in the chambers.

The rise from the top water line in the basin, at Northumberland, to the surface line of the pool, at Nanticoke, is sixty-eight feet and eighty-nine hundredths. The comb of the feeder dam at Nanticoke, is eight feet and thirty-four hundredths above low water in the Susquehanna, and one foot and thirty-four hundredths above four feet water in the canal. The dam carries a pool five miles above it into Wyoming valley, and within two miles and a half of Wilkesbarre.

The original estimate of cost for this division, made in 1828, was four hundred and seven thousand three hundred and thirty-five dollars and thirty cents. The first contracts were made in 1828, the water was admitted in November, 1830; the actual cost of the canal, excluding damages to lands, is now ascertained to be one

million ninety-six thousand one hundred and seventy-eight dollars and thirty-five cents and a half.

The following is a statement of the principal works on the division, and of their respective cost:

Cost of sections, excavation, embankment, &c.	\$ 661,456 03	
202,892 perches of outside wall,	125,695 64	
171,270 yards of inside wall,	54,232 63	
	<hr/>	\$821,384 50
Cost of one guard and seven lift locks,		32,479 97
Feeder dam across the Susquehanna at Nanticoke falls—crib work filled with stone, covered and gravelled, abutments of rubble masonry, the length between the abutments seven hundred feet, and twelve feet average height from foundation, cost,		\$9,311 25
Contracted for in 1828, finished for use November 29, 1830.		
5 stone culverts—Their whole span twenty-six feet,	5,262 69	
24 wooden ditto,	2,858 62	
	<hr/>	8,121 31
4 waste wiers and two safety gates, whole length one hundred and thirty-six feet, cost,		6,583 58
(1 more wanted, \$500)		
5 aqueducts—Longest one hundred and seventy-two feet, shortest seventy-four feet; length of the whole between the abutments, five hundred and fifty-four feet. The abutments and piers of stone, superstructure wood, width of the trunks from twenty-two to twenty-eight feet,		25,003 02
A towing path bridge forms part of the superstructure.		
8 lock houses,		3,200 10
8 basins—Their aggregate cost about four thousand five hundred dollars, but they were estimated with the sections; they are about three hundred feet long by one hundred feet wide.		
About six miles of road, cost,		57,978 90
61 farm, 17 road, 1 foot and 2 towing path bridges, cost,		40,241 27
Excluding seventeen thousand four hundred dollars the cost of embankment estimated with the sections.		
26½ miles of fencing,		6,596 62
(25 miles more wanted \$6,300)		
Repairs,		6,920 18½
Contingent expenses,		3,403 87
Engineers,		28,094 88
Superintendents and clerk,		3,970 50

Damages,	3,891 25
1 water pipe and syphon,	266 50
Ice breakers wanted,	660 00
Clearing creek,	2,900 94
1 lock house built,	240 00
7 more required.	

Beside the above, fifteen thousand dollars will be required for bridges, lock houses, fencing, &c.

15,000 00

81,096,178 54½

8 lock-keepers wanted.

THE DELAWARE DIVISION

Of the Pennsylvania canal, commences at Bristol, on the Delaware river, and runs along that stream through Bucks and Northampton counties, to Easton. The whole length of the division, measured along the towing path bank, from the tide basin at Bristol, to the northern side of the feeder dam across the Lehigh at Easton, is fifty-nine miles and three fourths.

The country along this division, presents about thirty miles of surface extremely favorable for the construction of a canal, about sixteen miles less favorable, and fourteen miles that is difficult, and along a considerable portion of which the river bluffs or cliffs, are high, steep and rocky.

On this division, the width of the canal at bottom is twenty-five feet, at top water line forty feet, and its depth of water five feet. In its course, there are twenty-three lift locks, ranging from six to ten feet lift, also two out-let and two guard locks. The canal and locks are arranged for boats of sixty-seven tons burthen. Eighteen lock-keepers are necessary on this division.

The rise and lockage from mid tide at Bristol, to the level of the comb of the feeder dam across the Lehigh, at Easton, is one hundred and sixty-four feet. The comb of the dam is twelve feet above low water in the Delaware, at the out let lock immediately below the dam.

The original estimate for constructing this division, was six hundred and eighty-seven thousand dollars. The first letting took place in October, 1827. The filling the canal for navigation, in its whole course, commenced in October, 1830.

It is now ascertained that the actual cost of the division, exclusive of damages to property, will be one million two hundred and three thousand seven hundred and sixty-five dollars and five cents. The amount of damages paid on this division, prior to the 1st of November, 1830, was thirty-four thousand two hundred sixty-two dollars and sixty-four cents.

The following is a statement of the principal works, and their respective cost.

The stone work of the locks, aqueducts, culverts, bridges, abutments, &c. on this division, is generally rubble masonry.

Cost of constructing the sections, excavation, embankment, &c.	533,986 32
230,191 perches of outside wall, cost,	147,091 54
37,594 perches of inside wall, cost,	34,490 17
Expenditures in making roads, but which, in the engineers estimates, are returned as expenditures for constructing sections. This sum includes the cost of ten thousand perches of stone wall, properly chargeable to the cost of roads,	
	30,473 54
Cost of 23 lift-locks,	108,715 70
Cost of 2 guard locks and 1 out-let lock,	21,794 39
Tide lock at Bristol,	9,500 00

The lift locks are eleven feet wide and ninety-five feet long, clear, in the chambers, &c. They are constructed of rubble masonry laid in cement, on timber bottoms with longitudinal sills and upright posts, faced with plank spiked to the timbers. The tide lock at Bristol, guard lock at Easton, and the out-let lock into the river Delaware, from the pool at Easton, are twenty-two feet wide by one hundred feet long, clear, in the chambers. The guard lock at New Hope, is eighteen feet by one hundred feet, and affords a communication with the river Delaware.

Feeder dam across Lehigh, at Easton, crib work filled with stone, and gravelled, three hundred and seventeen feet long and twelve feet high,	\$ 9,000 00
9 aqueducts, the shortest twenty five feet, the longest one hundred and seventy eight feet between the abutments, length of the whole six hundred and thirty one feet; the abutments and piers are of rubble masonry, the superstructure of wood, trunks twenty feet wide. Towing path bridge forming part of the superstructure,	63,005 98
20 culverts, rubble masonry laid in cement. The span of the whole is one hundred and thirty eight feet,	24,863 63
19 waste wiers, with sluice gates—woodwork with protections of masonry. The whole overfall is one thousand four hundred and forty one feet,	22,783 43
16 lock houses built,	9,200 46
Tide basin of five acres and a half, constructed in the Delaware, and pier at Bristol, nearly finished, estimated lately to cost, when completed,	32,000 00
47 road bridges, stone abutments, superstructure of wood, embankments included,	34,552 34
49 farm bridges, as above,	24,388 78
3 turnpike, and 3 foot bridges,	5,114 96
52 miles fencing along canal,	12,182 13

Paid for alterations and for repairs before supervisors were put on the division,	25,297 88
Incidental expenses, postage, books, paper, &c.	2,441 69
Paid engineers, superintendents and other officers, for surveys,	43,672 04
Cost on one culvert and 15 waste wiers, which were afterwards dispensed with, or the plan of location altered,	2,239 92
2 lock houses and collector's office,	\$ 1,350
Fencing yet required, about twelve miles,	2,920
A foot bridge ordered,	200
Water ways around locks,	2,500
	<hr/> 6,970 00
Add damages already paid,	34,262 64
	<hr/> <hr/> \$1,238,027 69

THE DELAWARE DIVISION

May be fairly considered as an extension of the Lehigh coal and navigation company's canal; it will therefore be proper to bring this canal into view, in connexion with the Delaware division, more especially as this division must derive its principal business and income from the transportation of coal, which must first pass down the Lehigh canal.

The Delaware division unites in a pool of the Lehigh, at Easton, with the canal owned by the Lehigh coal and navigation company.

The Lehigh canal is of the most substantial character, and does high credit to the enterprize of the company at whose expense it was constructed, and to the science and economy of the engineers and officers who had charge of the work. The canal runs from Easton to Mauch Chunk, a great part of it through an extremely difficult country, having a very large amount of lockage to overcome in its rocky and precipitous course. The canal has forty five feet width at bottom, sixty feet surface, and five feet depth of water. Its locks are twenty two feet wide, and one hundred feet, clear, in the chambers; are calculated for single boats of one hundred and forty tons, or double boats of seventy tons. It is forty six miles long, in which distance there are forty seven lift, and six guard locks, and nine dams. The whole lockage from low water in the Delaware, at Easton, to the head of the canal, at Mauch Chunk, is three hundred and sixty feet and eighty seven hundredths. It was finished for use in June, 1829, about two years after its commencement.

The whole cost of its construction, exclusive of damages paid and rights purchased, was one million three hundred thousand dollars.

Forty-six thousand tons of coal passed through this canal, since April 1st, 1830.

The Morris canal connects with the Delaware river at the Jersey side, directly opposite the junction of the Delaware division and Lehigh canal, and runs across New Jersey to the tide waters in the

bay of New York. This canal is nearly finished, and besides its other business, will be a channel for the transportation of the Lehigh coal to Jersey, and the city of New York. It will no doubt be a line of communication that will create some business on the Delaware division.

Under the provisions of the fourth section of the act making further provisions for canals and roads, passed in March last, F. W. Rawle, engineer on the west branch, was directed to make "a survey, plan and estimate, of a canal and lock communication from the nearest and best point on the west branch canal, to the Susquehanna river, at or near the town of Lewisburg, in Union county." The report of Mr. Rawle is herewith submitted, shewing that the length of said communication will be three thousand four hundred feet, that three locks will be required, also a dam across the west branch; and that the whole work will cost twenty five thousand two hundred and sixty-six dollars and forty nine cents.

The same act directs "a like survey, plan and estimate of a canal and lock communication, from the nearest and best point on the canal, at or near Harrisburg, to the Susquehanna river." The duty was assigned to E. F. Gay, engineer on the eastern division. His report, herewith submitted, shews that the canal will have a length of seven hundred and ninety two feet—two locks, each eight feet lift, and is estimated to cost twenty five thousand eight hundred and eleven dollars and eleven cents.

The board are of the opinion, that the forming of these connexions with the Susquehanna, river will operate advantageously to the canal, and will afford valuable facilities to the citizens of the surrounding country.

The propriety of authorizing the construction of an outlet lock from the eastern division of the Pennsylvania canal into the Susquehanna river at Columbia, is recommended.

Many of the coal and other arks and boats intending to run to the tide water at the mouth of the Susquehanna, will enter the canal from the upper parts of the river, and descend it, provided they can again have admission into the Susquehanna, so as to pursue their destined course. Boats also which have descended the river during a time of favourable water will ascend the canal, provided they can be admitted into it, and a considerable increase of tolls will ensue. This arrangement will be beneficial to the coal trade of the Susquehanna, as well as to other interests, and has been especially recommended to the board as of importance to the citizens of Wyoming valley.

On the subject of extending the Pennsylvania canal system, the board of canal commissioners remark: that the time is not distant when the increasing population of the northern, western and other regions of the commonwealth, will successfully demand the benefit of canals and rail-ways amongst them.

Whether it is at this time within the power of the commonwealth, with due reference to her credit, to meet the interests and desires of such portions of the state as now claim to be embraced within

the range of improvements by canals, will depend on the facts that may present themselves before the legislature, during the present session. The board will merely bring into view those improvements which they think it desirable to be made as early as practicable, consistent with the general credit of the state. They are as follow, viz :

First—The continuation of the canal along the north branch of the Susquehanna, from the head of the Nanticoke Pool to the New York state line.

Second—The continuation of the canal or the arrangement of a slack water navigation along the west branch of the Susquehanna, from the head of the pool at Muncy, to the mouth of Bald Eagle creek.

Third—The improvement of the navigation of the Monongahela river, by means of slack water navigation, from near Pittsburg, at least to Brownsville.

The forming a communication from Pittsburg to Erie Harbour, by means of a canal, slack water or rail-way, or by a connexion of these several means, by way of either the Beaver and Shenango, or the Allegheny.

The immediate extension of the north branch canal to the mouth of the Lackawannock, is of importance, as giving facilities for the shipment of the anthracite coal along the whole line through the Wyoming valley, which by passing down the north branch, Susquehanna and eastern divisions, will give business and tolls to the canals.

The final extension to the state line, will by a canal for a distance of sixteen miles from thence to Elmira, give a connexion through the Chemung and Seneca canals, and the Seneca and Cayuga canal with the great Hudson and Erie canal, and so will open a communication to all the interior of the state of New York. The route from the waters of the Susquehanna to the Seneca lake was deemed of sufficient importance to warrant an examination and survey by authority of the legislature of Pennsylvania as early as the time of Governor Snyder.

The extension of the west branch to Bald Eagle, so as to reach the bituminous coal region, is important, as this species of coal is of particular value in certain branches of manufactures, and as it bears a higher price in the same market than the anthracite coal. It is the true policy of Pennsylvania to cherish all her manufacturing establishments, and the rendering coal abundant and cheap is one evident means of favoring them.

The extension of the French creek feeder or canal, from its present termination to the mouth of French creek, will be of evident advantage. At present it has no beneficial communications.

The construction of a canal or slack water navigation from the mouth of Beaver creek to a point near New Castle, will be of importance to a considerable population. At one-end it will be connected with the Ohio river, and form a line of communication common to the meditated canal to Erie, as well as with the canal proposed to be extended from New Castle to the Ohio canal.

The second section of an act, passed the 22d April, 1829, made it the duty of the board of canal commissioners to locate the route of a suitable navigation, either by canal or by canal and slack water, between the city of Pittsburg, or the mouth of the Kiskiminitas, and the borough of Erie, within the year 1829. With the requisitions of this act the board did not comply; but on the 17th December, 1828, when a resolution, declaring an actual location, in compliance with the law, was under consideration before the board, a substitute was offered, which stated that the board could not then make the location, but which contained an opinion in favor of a route from Pittsburg, by the Shenango to Erie. The substitute was adopted, one member voting against it. Thus a location, according to law, was not made, although a majority of the members appear, by the minutes, to have been in favor of a location on a particular route.

The improvement of the Monongahela river by slack water, will be of evident advantage to the population bordering upon it. All the work necessary can be effected in one season, as the building of three or four low dams, and of as many river locks is all that will be required, in order to establish a steam boat navigation to the national road at Brownsville. The improvement of the river will facilitate the passage of the produce of the country along the Monongahela to Pittsburg, so as to take the line of the Pennsylvania canal to Philadelphia.

The following is a statement of Tolls received on the Pennsylvania canal, up to the 1st day of December, 1830.

ON THE WESTERN DIVISION.

The amount of tolls received by Thomas Johnston, collector at Blairsville, previous to the 1st November, 1830,	\$7,224 79½	
Received from the 1st of November to the 1st of December, 1830,	1,217 34	
	<hr/>	8,442 13½
Amount of tolls received by David Brenneman, collector at Leechburg, prior to the 1st day of November, 1830,	3,406 63	
Received from the 1st to the 20th November, 1830,	783 89	
	<hr/>	4,190 52
Amount of tolls received by W. B. Foster, collector at Pittsburg, up to the 1st November, 1830,	2,779 11	
Received from the 1st to the 30th November, 1830,	566,32	
	<hr/>	3,145 33
Whole amount of tolls received on the western division,		<hr/>
		\$15,777 98½

EASTERN DIVISION.

The amount of tolls received by Thomas C. Reed, collector at Harrisburg, prior to the 1st November, 1830,

3,502 49½

Received from 1st November to 1st December, 1830,

1,400 00

4,902 49½

JUNIATA DIVISION.

The amount of toll received by L. Reynolds, collector at Lewistown prior to the 1st November, 1830,

595 36

Received from the 1st to the 20th November, 1830,

559 06

754 42

\$21,434 90½

Amount of tolls received at the bridge over Duncan's island, up to 1st of December, 1830,

5,578 00

\$27,012 90½

On the subject of damages the commissioners have only to remark that the enactments of the legislature cannot be too maturely considered as to their bearing. The commissioners are sworn to obey the principles contained in the laws as they exist, and cannot administer them as a portion of the citizens desire them to be understood. Whatever principles may be adopted and practised on, should be stable and uniform in their character, as otherwise the patriotic, the liberal or necessitous may accept the awards made them under the existing laws, whilst other claimants to whom awards may have been made, bearing a due relation to such as have been accepted, await to have their claims decided under other laws, framed on other principles.

The existing laws require that the commissioners and appraisers shall take into consideration the advantages as well as the disadvantages to the property and landed estate through which the canal shall pass. In judging of these, the parties making claims for damages invariably urge the equal benefits which some neighbour derives from the canal without losing any portion of his lands or suffering any injury, whilst he fails to take into view the fact, that his own estate is enhanced in value, or to consider the disadvantages to the citizen of other parts of the Commonwealth, from whose roads transportation, travel and business are diverted, and who, without sharing any direct portion of the benefits of the canal or of the expenditures during its construction, is required to stand responsible for his quota of the public expenditures.

It is a singular fact that on those divisions of the canal on which the smallest awards were made, the parties have generally accept-

ed the amount offered; whilst on those divisions on which the largest offers were made, the law relating to damages has been disapproved and the awards made under it, in many instances, rejected.

Since the first of July last the board have considered and decided on upwards of three hundred cases of claims for damages. A number are yet pending, to which the board could not give the necessary time and attention, consistent with what they deemed their primary duty, to wit: the necessary arrangements for the completion of the canal within the present year.

The laws provide that when the canal is finished, or within one year thereafter, persons deeming themselves injured, may present their claims for damages, and therefore but few claims have yet existed upon the commissioners to give their time to the subject of damages in preference to other duties. The commissioners cannot forbear to urge upon the legislature the necessity of their preparing and enacting a code of laws for the government of the Pennsylvania canal and rail-way. It is material that a well arranged system for the regulation and government of the extensive interests involved in these works should be matured. Well defined and efficacious laws, distinct in their purport and admitting promptitude in their application will be found absolutely necessary.

It is true the legislature have invested the canal commissioners with certain powers to enact regulations for the government of the canal and rail road, but it ought not to be expected that a few individuals, having numerous duties to perform and limited to an acquaintance with the local interests of parts only of the state, should devise a system as perfectly adapted to the general interest, as that body representing all the localities of the commonwealth, and from whose greater numbers a proportionate degree of weight and intelligence may justly be expected. The making of laws is a duty which especially appertains to the legislature. It cannot be expected that the citizens of the commonwealth will acquire as early an acquaintance with laws enacted by a board of commissioners as if they had been the subject of legislative discussion. By the debates in the legislative body not only the representatives from every part of the commonwealth acquire a knowledge of the laws and the policy and wisdom in which they are founded, but the reasons of the law are promulgated and diffused amongst the citizens at large, who stand ready to yield obedience and support to the acts of the highest authority of the land. The passage of laws through all their deliberate forms, discussed and sanctioned by the representatives of the people and approved by the chief magistrate of their choice, ever will meet a respect which will be yielded to no subordinate power.

The legislature will find on the minutes of the board an extensive system prepared by the canal commissioners and adopted under the powers imparted to them by the legislative act of 1830. This system though imperfect may be found useful in enabling the legislature to arrange a better.

On the 20th of March, 1829, the former board of canal commissioners passed the following resolution: "Resolved that the superintendent and engineer on the French creek feeder be directed, during the ensuing summer, to survey and plot definitively that portion of the contemplated canal between Conneaut lake and the basin at Erie, by the route reported by the board to the legislature at its present session, and report to this board, when completed, the estimate of expense of construction, with profiles and maps of the same."

Mr. Ferguson, the then principal engineer upon the feeder having been transferred to the Juniata division, this duty was afterwards assigned to B. B. Vincent, the principal assistant engineer on the feeder. His report and estimate are herewith submitted; as also a report and estimate of the same line, made by Wm. Dickson, the former superintendent upon the feeder.

Under the provisions of the 2nd section of the act of the 27th of March last, making further appropriations for canals and roads, the board, on the same day on which the law was passed, opened a correspondence with three skillful and experienced engineers with a view to the examination of the different routes for crossing the Allegheny mountain. Owing to other engagements of the engineers, designated the organization of the party for making the the surveys and examinations contemplated by the legislature, was unavoidably delayed until late in the month of July. The engineers appointed were Moncure Robinson, Col Stephen H. Long, and Major John Wilson. They were instructed by the board in making their examinations under the provisions of the act of assembly, to take into view a portage by means of a road so graded as to admit of its being adapted either to a Macadamized turnpike or to a rail-road. In the course of the summer a thorough examination of the mountain has been made. The engineers were not enabled to close their examinations until some time in the present month nor to make any communication until their report, in part, of the 18th instant, which was received by the board on the 20th, and which is herewith submitted, relating to the route and plan of crossing the mountain.

This report, together with the report upon the same subject made by Moncure Robinson in 1829, will furnish such facts as are necessary to come to a conclusion as to the route and manner of crossing the Allegheny mountain. No estimate of the cost has yet been received, the engineers not having had time to report upon that subject.

Signed by order of the board,

JAS. S. STEVENSON, *President.*

ATTEST.

FRS. R. SHUNK, *Secretary.*

Harrisburg, December 21, 1850.

Document No. 1.

To the Board of the Canal Commissioners of the State of Pennsylvania :

GENTLEMEN :

In conformity to an act of the Legislature of Pennsylvania, dated on the 27th of March, 1830, authorizing the appointment of Engineers for the performance of certain duties therein specified, the undersigned having had the honour to be selected by the Board of Canal Commissioners, to carry into effect so much of said act as relates to the Allegheny Portage, and having devoted, so far as it has been practicable, their careful attention to the several subjects confided to their decision, embrace this early opportunity to report, *in part*, the facts developed by their investigations, together with a few of the leading conclusions to which they have been enabled to arrive. They at the same time beg leave to apprise the Board of Canal Commissioners, that the lateness of the season, at which their field operations were unavoidably commenced, and the inadequacy of the force employed in the execution of the complicated surveys that have been deemed essential to a proper knowledge of the several routes claiming attention, render it utterly impracticable to present at this time a full report, embracing all the topics connected with the duties in which they have been engaged, and for which their services were required.

The first object to which the attention of the engineers was directed, was that of ascertaining the localities and other circumstances connected with the several routes that have been proposed. With this object in view, they had recourse to the various documents relating to the Allegheny Portage, that have on former occasions been submitted to the Legislature. From these it appeared that the first route surveyed with a view to a portage road communicating between the Juniata and Conemaugh rivers; was that explored agreeably to the directions of Canvas White, Esq in 1827, leading from a point near the junction of the constituent branches of the Juniata, and about one and a half miles above Frankstown, to the confluence of the N. and S. Forks of the Little Conemaugh, and thence downward to Johnstown. The line run on this occasion however, is to be regarded merely as experimental, and led to no other results, except that of determining the elevations of several points, and the distances between them; very little attention having been paid either to the adoption of a system, or to its adaptation to the natural surface. With respect to the results above mentioned, it should be added, that subsequent surveys have sufficiently established their accuracy. The bench mark, made at the Bob's creek summit, in connexion with this route, has served as a land mark, to which all subsequent surveys in this direction have been referred.

The next surveys that were instituted for the same object, were made in the year following (1828,) under the direction of N. S. Roberts, Esq. These surveys embraced a comparatively broad range of country, extending from Frankstown westwardly to Johnstown, and from the Blue Knob northwardly to the Sugar run summit.

The object of these surveys, appears to have been to ascertain the practicability of a route for a rail-road, leading across the summit of the Allegheny mountain, at a uniform inclination or declivity, not exceeding one or one and a half degrees, excessive curvatures and deviations from a direct course, having been accounted less objectionable than a vertical rise or depression, greater than the limit prescribed. The routes surveyed and designated on this occasion, in addition to numerous experimental routes, which were abandoned as impracticable, amounted to no less than five in number, no part of either of which had an inclination exceeding one and a half degrees. A brief description of the several routes alluded to, beginning at the most southerly, and ending at the most northerly, will here be attempted; and since they are respectively to be regarded as a link in the great chain of intercommunication, stretching through the state, from Philadelphia to Erie, as well as for the purpose of giving a better understanding of their comparative merits, it will be proper to consider them as connected with the main chain at such points as will admit of a common junction of all the routes. With this view the points selected are Frankstown and Johnstown, between which the distances by all the routes will be estimated.

	Distances in miles.	Heights of summits in feet.	
		above Frankstown	above Johnstown
<i>Route No. 1, by N. S. Roberts, Esq.</i> From Frankstown, by way of M'Key's Gap, south side of Blue Knob, Bob's creek summit, Ben's creek and Little Conemaugh, to Johnstown.	51 $\frac{1}{3}$	1590	1343
<i>Route No. 2, by N. S. Roberts, Esq.</i> From Frankstown, by way of Newry, north side of Poplar run, Bob's creek summit, Ben's creek, and Little Cone- maugh, to Johnstown.	49 $\frac{3}{4}$	1590	1343
<i>Route No. 3, by N. S. Roberts, Esq.</i> From Frankstown, by way of Hollidays- burgh, south side of turnpike, Sugar run summit, Laurel run and Little Cone- maugh, to Johnstown.	51	1419	1166
<i>Route No. 4, by N. S. Roberts, Esq.</i> From Frankstown, by way of Hollidays- burgh, Blair's Gap, north side of turn- pike, Sugar run summit, &c. as in route No. 3.	50 $\frac{3}{4}$	1419	1166
<i>Route No. 5, by N. S. Roberts, Esq.</i> From Frankstown, by way of Hollidays- burgh, north side of Sugar run, Sugar run summit, &c. to Johnstown, as in route No. 3.	47 $\frac{1}{8}$	1382	1129

In 1829, an examination and survey of the Allegheny portage, was executed under the direction of Moncure Robinson, Esq. in

conformity to certain principles adopted by him, as best adapted to the nature and condition of the portage, and to the exigencies of the contemplated road. Among the leading considerations recommended by this gentleman, as governing principles in the location of the road, are a reduction of the height of the summit, at the expense of a tunnel a mile long, the construction of inclined planes, horizontally direct, but varying in their inclinations from six to nine, and in one instance, to about thirty degrees; the adoption of self acting planes, as a means of conveying loads upward and downward, on the east side of the mountain; the employment of stationary power, on all of his inclined planes, to the exclusion of a power moving with its load, &c.

A majority of the board of engineers, who had as yet acquired no personal knowledge of the localities to be traversed by the contemplated road, nor of the nature of the obstacles to be overcome, were desirous of instituting a course of examinations and surveys, the leading objects of which were to obviate the necessity of constructing a tunnel at the summit, till such time as the exigencies of the trade upon the road should require it; to avoid the adoption of inclined planes having inclinations greater than five degrees, and if possible, to limit their inclination to three degrees; to provide for a route upon which not only *stationary* but *progressive* power might operate to advantage, according to circumstances; to effect a definitive location of a route upon ground most favourable for the construction of a road in regard to the principles as well as to the cost of construction, &c.

With these objects in view, and at the instance of a majority of the engineers, a party was organized early in the month of August last, and placed under the immediate direction of Lt. Col. Long, who has ever since devoted his unremitting personal attention to the field operations in which the party have been engaged, from the date of their organization to the present time. The operations of the party were performed in the following order, and lead to the results hereinafter exhibited, viz:

First, the survey of a *crest line* leading along the main summit of the Allegheny mountain from the Sugar run summit to the Cedar Swamp summit, and embracing a distance of about fourteen miles. The results obtained by this survey gave for the comparative elevations of the several gaps in the comb or crest of the mountain, the following altitudes above the level of the Sugar run summit, which last proved to be the lowest depression of the mountain, viz:

Assuming zero as the elevation of the Sugar run summit, its height will be, .0 feet.

Height of Blair's Gap summit above Sugar run summit, 49		
do	Adams' summit above	do 175
do	Laurel summit above	do 222
do	Big Spring summit above	do 304
do	Bob's creek summit above	do 213
do	Cedar Swamp summit above	do 167

The comparative altitude of the mountain on other parts of the crest line, as deduced from actual observations, varied from fifty to five hundred feet above the level of the Sugar run summit, 1238 to 1738 feet above Johnstown, or 1418 to 1918 feet above Frankstown.

2d. The survey and definitive location of a route for a rail-road from Hollidaysburgh to Johnstown, passing northwardly of the turn-pike, from a point about one-fourth of a mile westward of the former place to a point about three fourths of a mile westward of the summit of the mountain, which is crossed by the route at the depression called the Blair's Gap summit, thence southwardly and westwardly, along the vallies of the Laurel run, and the Little Conemaugh, on the south side of the latter, to a point a little below Burk's Saw mill, where the route crosses the Little Conemaugh; thence downward on the north side of that stream, to the gorge of the Horse Shoe Bend, where it crosses the Conemaugh at an elevation of about 60 feet above the surface of low water, requiring a bridge only 500 feet long; thence downward on the south side of the Conemaugh to the gorge of the Staple bend, through which it passes in a distance of 1000 feet, at an elevation of about 80 feet above the surface of the Conemaugh, and at a depression of about 250 feet below the crest of the ridge intervening between the Conemaugh and the mouth of Deep run, requiring for its passage through the gorge, a tunnel 1000 feet long; and thence downward along the south side of the Conemaugh to Johnstown.

This route embraces eleven inclined planes, viz: six on the east and five on the west side of the mountain. Some idea of the character and properties of these planes, may be derived from the following statements, which are necessarily incomplete, in consequence of the unavoidable absence of the field notes, from which alone their precise dimensions, &c. can be drawn. The planes are numbered from east to west, in the order of their occurrence on the route from Frankstown to Johnstown.

<i>Inclined Planes,</i>	<i>Inclination.</i>	<i>Approximate length.</i>
No. 1 (East of mountain.)	1° to 1° 15'	about $\frac{1}{2}$ mile.
No. 2 "	2° to 2° 30'	" $\frac{1}{2}$ mile.
No. 3 "	2° 35'	" $\frac{2}{3}$ mile.
No. 4 "	2° 35'	" 1 mile.
No. 5 "	{ 4° 35'	" $\frac{3}{5}$ mile.
	{ 2° 53'	" 1 mile.
No 6 "	{ 4° 56'	" $\frac{2}{3}$ mile.
	{ 2° 53'	" 1 mile.
No. 7 (West of mountain,)	2° 40'	" 1 mile.
No. 8 "	2° 53'	" $\frac{4}{7}$ mile.
No. 9 "	2° 53'	" $\frac{4}{7}$ mile.
No. 10 "	2° 53'	" $\frac{2}{3}$ mile.
No. 11 "	2° 53'	" $\frac{2}{3}$ mile.

In connexion with the inclined planes No. 5 and No. 6, as exhibited in the foregoing table, it will be perceived, that the statements are carried out in duplicates, the reason whereof is, that

the most direct route presented by the conformation of the hills would not admit of a graduation at an angle less than the larger inclination therein contained; also, that in order to effect a location, at an inclination not exceeding three degrees, a longer and more circuitous route would be required, as exhibited in the duplicate connexion.

Those parts of the route situated between the inclined planes, and exteriorly of them, were located at an inclination, ascending towards the summit of the mountain, in no case exceeding a rise of thirty feet in the distance of a mile, except on that portion of the route situated between Duncan's tavern, and the Hollidaysburgh bridge, about two miles, on which a rise of about 42 feet per mile, was deemed more conducive to economy.

3d. The survey of an experimental line or route leading through Newry, ascending the valley of North Poplar run, and its south branch, crossing Bob's creek near its intersection with the road leading from Frankstown to Johnstown, crossing the Allegheny mountain at a point called the Cedar swamp summit, and descending to the Conemaugh, by the vallies of the Cedar run and south fork of Conemaugh.

The uncertainty that existed in reference to the distance and facilities presented by this route, and the difficulty of forming a correct opinion as to its relative merits without an actual survey, rendered this part of the service obligatory if not essential to a competent discrimination between the several routes claiming the attention of the engineers.

The same principles that governed in the location of the Blair's Gap route were applied here, with such modifications as any change in the aspect or condition of the country through which the line passed, seemed to require. The leading peculiarities presented by this route, were a variableness in the grade best adapted to the natural surface, ranging from an ascent of ten to ninety feet per mile, on the first nine miles above Frankstown, the necessity of one or more five degree planes in passing thence to the summit of the ridge, dividing between Poplar run and Bob's creek; the occurrence of numerous ravines, and mountain spurs, requiring heavy embankments and deep cuttings, eastwardly of the main summit, and a declivity of about 40 feet per mile, on the last four miles situated immediately above the confluence of the N. and S. forks of the Conemaugh. From the point last mentioned to Johnstown, a distance of $8\frac{3}{4}$ miles, this route is coincident with the route just before described.

In addition to the routes above considered, numerous other lines were traced and levelled as preliminary to the adoption of the most favorable route, amounting in the aggregate to a distance of nearly 200 miles.

These several routes, together with that surveyed in 1829, respectively prolonged so as to embrace the entire distance from Frankstown to Johnstown, will be exhibited in continuation of the list presented in the former part of this essay, and in the following order, viz :

Lengths of routes in miles.	Heights of summits in feet.	
	above Frankstown.	above Johnstown.

Route No. 6, by M. Robinson Esq

From Frankstown, by way Hollidaysburg, south side of turnpike, Blair's Gap summit, along the vallies of Laurel run and Little Conemaugh, crossing the latter six times, to Johnstown,

40 $\frac{3}{4}$ 1279 1028

Route No. 7, by Lt. Col. Long.

From Frankstown by way of Newry, Poplar run, Bob's creek, Cedar swamp summit, Cedar run, S. fork of Conemaugh, and Little Conemaugh, to Johnstown, crossing Conemaugh only twice,

39 $\frac{1}{3}$ 1514 1257

Route No. 8, by Lt. Col. Long.

From Frankstown, by way of Hollidaysburgh, north side of turnpike, Blair's Gap summit, and downwards in vallies of Laurel run and Conemaugh, crossing the latter twice only, to Johnstown, crossing the summit by means of planes, limited to inclinations of three degrees,

39 $\frac{1}{4}$ 1397 1137

Route No. 9, by Lt. Col. Long.

From Frankstown, by way of Hollidaysburgh, &c. as in the preceding route No. 8, to Johnstown, arriving at the summit by means of two planes of an inclination less than five degrees each, the inclination of the other planes, being limited to less than three degrees,

38 $\frac{1}{2}$ 1397 1137

The several routes claiming the attention of the engineers having been thus considered, their relation to a direct line extending from Frankstown to Johnstown, deserves particular attention. Such a line, traversing the country between the points above mentioned, would have a course bearing S. 74° W. from Frankstown, and an extent of about thirty-one miles. It would cross the crest of the Allegheny mountain near the Big Spring summit. or about one and a fourth miles northwardly of Bob's creek summit. Its direction thence to Johnstown is nearly parallel to the general course of the Conemaugh from Lilly's mill to the gorge of the Horse-shoe Bend, and of course to that of the routes Nos. 6, 7, 8 and 9, which pursue the valley of the Conemaugh through that distance. Any route meriting attention from its general proximity to the direct line, and passing through either of the depressions in the summit noticed in a former part of this paper, must pass in the vicinity of Hollidaysburgh, ascend the valley of Blair's Gap run to the turnpike gate; thence pursue its main branch, and a small tributary of the latter, to

the Laurel or Adams' summit, and thence downward along one of the branches of Bear Rock run to Lilly's mill; and thence by routes Nos. 7, 8 and 9 to Johnstown. Anxious inquiries were made with a view of ascertaining the practicability of a route in this direction, which were rendered fruitless in consequence of the great elevation of those summits. With this exception no route was presented maintaining a nearer parallelism with the direct line than those passing through Blair's Gap.

A map of the country embracing the Allegheny portage, and exhibiting the several routes treated of in this essay, on a scale of one inch to the mile, is now in progress and will be presented to the board as soon as practicable. A view of such a map will impart more satisfactory information with respect to the geography of the country, the position of the several routes, and their relations to the eastern and western divisions of the Pennsylvania canal, than volumes of description could give without it.

Drawings, in plan and profile, illustrative of the horizontal and vertical positions of the located route, and of the particular topography in its vicinity, accompanied by suitable remarks on the aspect, geology, &c. will be prepared and submitted at the earliest practicable date.

An estimate of the cost of grading and bridging, as also of any other structures that may be deemed essential to a portage road, best calculated to subserve the purposes for which such a road is required, will also be submitted, in company with a final decision in reference to the manner of crossing the Allegheny mountain.

In view of what has been advanced in this paper, and in accordance with impressions derived from personal examinations of the country traversed by the several routes that have been proposed for the portage road, the undersigned feel warranted in awarding their decided preference to a route leading upward along the valley of Blair's Gap run, crossing the Allegheny mountain at the Blair's Gap summit, and descending to Johnstown, in the vallies of Laurel run and the Little Conemaugh.

The engineers having been directed by the canal commissioners, in conformity to a resolution of the board, dated March 27, 1830, to ascertain how far it might be eligible to construct a Macadamized turnpike across the Allegheny mountain, as a method for transportation, have made such surveys as were not only requisite for attaining that object, but might also be applicable for the construction of a rail-road.

The undersigned have accordingly no hesitation in giving a decided opinion in favor of the superior advantages of a rail-way over a turnpike, however well constructed, and whatever known power be applied for the propulsion of loaded carriages.

All which is respectfully submitted.

Harrisburg, Dec. 18th, 1830.

S. H. LONG, *Top. Eng'r. Bt. Lt. Col.*
JOHN WILSON, *Civil Engineer.*

Frs. R. SHUNK, Esq.

Sec'y. Board of Canal Commissioners.

REPORT

OF THE

CANAL COMMISSIONERS.

READ IN THE HOUSE OF REPRESENTATIVES, DECEMBER 9, 1836.

HARRISBURG:

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REPORT

OF THE

CANAL COMMISSIONERS.

CANAL COMMISSIONERS' ROOM,

December 8th, 1836.

His Excellency, JOSEPH RITNER,

Governor of Pennsylvania.

SIR—By order of the board of Canal Commissioners, I have the honour of transmitting to you their annual report, for the year ending the first of November, 1836, and the accompanying documents.

MOSES SULLIVAN, *President.*

The Canal Commissioners submit the following report :

The period having arrived when it becomes the duty of the board to communicate to the legislature a statement of the condition of the improvements of the state, for the past year, they undertake the task under the most pleasing auspices. They cannot, without injustice to their own feelings, avoid expressing their gratification in being able to announce to the citizens of the commonwealth, their belief, that the question of the ultimate advantage and profit of the system has almost ceased to be questioned.

Unequivocal developements, in relation to the utility and final success of the public works, are becoming so strikingly obvious, as to remove all doubts from the minds of the most wavering. Notwithstanding the unusual obstacles to early operations last spring, caused by the almost unparalleled severity and long continuance of the winter, the revenue derived from the system has advanced with a pace fully characteristic of the enterprise and steadfastness of our citizens.

In consequence of the protracted severity of the past winter, the opening of the navigation was delayed at least three weeks later than that of preceding years.

It was not until the first week in April, that the main line was in full operation.

The following table will show the dates of the admission of water, and the passage of the first boats, on each of the divisions of the canal.

	When water was let in.	When first boat passed.
Eastern div. Susquehanna,	March 28th,	April 4th,
Juniata division,	March 28th,	April 4th,
Western division,	March 25th,	April 1st,
Delaware division,	April 4th,	April 9th,

It was hoped that the navigation, thus delayed beyond former experience, would be uninterrupted during the rest of the season; but about the 10th of April, a great freshet occurred, which intercepted the use of the works for a considerable length of time.

The navigation of the main line was wholly prevented several days, so that the actual commencement of the business may be dated about the middle of April.

The same cause arrested the navigation of the Delaware and Susquehanna divisions, fully ten days longer. Notwithstanding all these disadvantages, the amount of tolls received and paid into the treasury between the 31st day of October, 1835, and the same day of this year, is

Canal tolls,	\$424,561 05
Rail way tolls,	246,963 63
Motive power tolls,	166,281 04
	<hr/>
	\$837,805 72
	<hr/>

Amount of tolls received and paid into the treasury

from November 1st, 1835, to this date, \$945,912 17

The geographical position of the state of Pennsylvania, the inexhaustible mineral treasure that every where abounds within her borders, the enterprise of her citizens engaged in transportation and other laudable pursuits, and the increasing solidity of the public works, give the most flattering assurance that the period is not far distant, when we will realize all the signal advantages, and the fulfilment of the wise predictions of those whose laudable labours in the convention of 1825, laid the basis of the system. Transporting companies generally are about doubling their capacity to transport, by a proportionate increase of cars and boats. Taking the energy and untiring zeal of those engaged in that business, as a prelude to the results of the next season, the board think it safe to estimate the amount of tolls that will be received on the public improvements during that period, at \$1,300,000.

Experience clearly proves, that if operations on the public works had commenced at as early a period the present season, as in preceding years, the amount of tolls would not have fallen short of one million, and would have produced an increase similar in ratio to that of 1835. Assuming this data, the amount that will be received during the present fiscal year, cannot fall short of the sum above specified.

The augmentation of business, arising from the growing importance of our commercial, agricultural and mineral interests, shows, that at a period no more remote than 1838, the improvements already constructed, notwithstanding the isolated situation of some of their parts, will, with proper economy, pay the interest on their cost of construction, repairs and supervision. This being once realized, will, in addition to the facilities and vast advantages extended to the citizens of the commonwealth individually, place Pennsylvania in a position unsurpassed by any member of the union, or perhaps, any country in the world.

The following table designed to show the approximate cost of the several divisions of the Pennsylvania canal and rail road, will also show their length, lockage and elevation of the highest point above mean tide at Philadelphia :

Divisions.	Costs.	Length in miles.	Lockage in feet.	Elevation high- est point above mean tide.
Phil'a and Columbia railway, Eastern division Susquehanna extending from Columbia to Duncan's Island,	\$3,330,127 55	82		560
Juniata division, extends from Duncan's Island to Hollidaysburg,	1,347,014 40	42.85	95	332
Allegheny Portage railway, ex- tends from Johnstown to Hol- lidsburg,	3,247,131 63	129.58	576.3	928
Western division extends from Johnstown to Pittsburg,	1,634,357 69 $\frac{3}{4}$	36.		2326
	2,800,000 00	105.	470.	1151
	<u>\$12,358,631 27 $\frac{3}{4}$</u>	<u>395.43</u>		
Delaware division extends from Bristol to Easton,	\$1,238,027 69	59.75	164	164
Susquehanna division extends from Duncan's Island to Northumberland,	1,039,256 77 $\frac{1}{2}$	39	86.5	418
North branch extends from Northumberland to Lacka- wannock,	1,398,412 77	73.25	111.9	529
West branch extends from Northumberland to Dunns- town,	1,580,351 84	72.00	131.	549
Beaver division extends from Beaver to New Castle,	481,282 98	24.75	132	
French creek division extends from Franklin to French creek feeder,	442,558 34	22.25	128.5	
French creek feeder extends from Bemis's dam to Con- neaut Lake,	292,103 72	23.00		
		<u>709.43</u>		

The above only shows the amount actually expended for construction in the first instance. Large sums have been expended for recon-

struction and repairs since the completion of the different lines, which are not included.

If to the above be added the Bald Eagle and Lewistown cross cuts, and the different feeders, it will make the aggregate of Pennsylvania canal and railway in operation, about 720 miles.

By reference to the preceding tables the cost of the main line of canal and railway improvement, and the amount of revenue that has been derived from the whole system, may be seen.

If it be borne in mind, that this revenue is derived almost exclusively from the two hundred and seventy-seven miles of canal, and one hundred and twenty of railway, which constitutes the main line, the amount of revenue will be found almost adequate to the payment of the interest on the cost of construction, the repairs and supervision of that part of the work.

The branch canals in which is involved a large expenditure, are comparatively unproductive, and must, in their interest, repairs and supervision, remain a charge upon the main line until the original design in their projection is carried out.

Viewing also the characteristics of the part of the state, through which the branches pass, connected with the destinations to which they point, it becomes plain that they will be as productive within their own spheres as the main line now is; besides as they generally diverge from the main line, they must become great auxiliaries to it. When we consider the reciprocity of interest that exists between the citizens of the northern part of Pennsylvania and those of New York, in the demand in the latter state, for the minerals of the former, and that of Pennsylvania for the gypsum and salt of her neighbour, added to the facilities of communication to the Atlantic coast, which the canal to tide, will create, the utility of the North Branch canal becomes obvious.

The unparalleled increase of the trade of the Lakes connected with the Borough of Erie, the decided advantages which that port has over all other points, in the capacity and safety of its harbour, in the freedom from the obstruction by ice, incident to locations nearer the outlet of the lake, and in the diminished distance to our commercial metropolis compared with others, are sure guarantees of the utility and profit of the work projected in that quarter.

The extension from Gettysburg in connexion with the Baltimore and Ohio, and the Wrightsville and Gettysburg rail roads when completed, will form a continuous line of rail road communication from Philadelphia to the navigable waters of the Ohio.

In view of these circumstances, and of the condition of the improvements of the commonwealth, and possessing as we do, all the elements of, and impulses to action, the path of policy becomes plain. Interest, as well as state pride and duty to our citizens, call for the prudent, but invigorous prosecution of the works just enumerated.—All these works, when finished, will combine in the formation of an unbroken chain of improvement, that will, while it increases the revenue of the commonwealth, promote the mutual interest of the citizens of the state, and of all those that surround her.

Pennsylvania has in operation six hundred miles of canal and one hundred and twenty of railway, and in the course of construction

The North Branch extension,	90 miles
The Erie extension,	112
The Tangascootack extension,	$7\frac{1}{2}$
The Gettysburg extension, (railway)	$41\frac{3}{4}$
	<hr/>
Total	$251\frac{1}{4}$ miles

The Tangascootack extension is nearly completed. A portion of each of the others has been placed under contract during the past season, and when completed, their whole extent will make the aggregate of Pennsylvania canal, eight hundred and nine and one half miles, and railway, one hundred and sixty-one and one quarter miles.

There have been constructed within the borders of the state by the enterprise of incorporated companies:

The Union canal,	80 miles
Schuylkill canal,	108
Lehigh canal,	$46\frac{1}{2}$
Delaware and Hudson canal,	25
Conestoga navigation,	16
Codorus do	$11\frac{1}{2}$
	<hr/>
	$286\frac{1}{2}$ miles
	<hr/>
West Chester railway,	9 miles
Mauch Chunk do	9
Room Run do	$5\frac{1}{4}$
Philadelphia, Germantown and Norristown railway,	21
Mine Hill and Schuylkill Haven railway,	20
Mount Carbon, do	7
Lyken's Valley, do	$16\frac{1}{2}$
Little Schuylkill, do	$21\frac{1}{2}$
Schuylkill Valley, do	10
Mill Creek, do	4
Pine Grove, do	4
Carbondale, do	$16\frac{1}{4}$
Philadelphia and Trenton do	$26\frac{1}{4}$
Beaver Meadow, do	$26\frac{1}{2}$
	<hr/>
	$196\frac{1}{4}$ miles

There are in the course of construction and under contract—

<i>Canals.</i>	
Columbia and tide canal	45 miles
Bald Eagle navigation,	25 "
Mauch Chunk and Wrights Creek,	26 "
	<hr/>
	96 miles

Railways.

Reading and Port Clinton railway,	20	miles
Philadelphia and Reading do	54	
Philadelphia and Wilmington railway,	17	
Catawissa and Tamaqua do	38 $\frac{1}{2}$	
Sunbury and Pottsville (branch included) railway,	51 $\frac{1}{2}$	
Williamsport and Elmira railway (6 $\frac{3}{4}$ miles in N. York)	73 $\frac{1}{2}$	
Lancaster and Harrisburg railway,	36	
Harrisburg and Chambersburg railway,	50	
Downingtown and Norristown do	20	
Marietta and Columbia do	3	
Strasburg do	5	
	<hr/>	
	368 $\frac{1}{2}$	miles
	<hr/>	

Thus the whole length of canal by the commonwealth in operation				600	miles
is					
Railway	do	do	do	120	
Canal extensions commenced,				209 $\frac{1}{2}$	
Railway do do				41 $\frac{3}{4}$	
Canal by companies in operation				286 $\frac{1}{2}$	
Railway by companies in operation,				196 $\frac{1}{4}$	
Canal by companies being constructed				96	
Railway do do do				368 $\frac{1}{2}$	
				<hr/>	

Making the aggregate, when completed, within the borders of the commonwealth,	1918 $\frac{1}{4}$ miles
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Some of these works will have a very important bearing upon the improvements belonging to the state. The canal being constructed from Columbia to tide, will create a great outlet for the mineral productions of Lyken's Valley and the Mahonoy, and of the North and West Branches, and in consequence will induce a large increase of business upon that part of the main line between Columbia and the commencement of Juniata division.

The condition of many of the locks on this division are defective, and will require to be rebuilt. The board deem it proper to recommend to the legislature, to make provisions for the commencement of doubling the locks on the Eastern division. The capacity of this portion of the canal ought to be made fully adequate to the increased tonnage that will ere long float upon its surface. In case the legislature concur in the opinion just expressed; and make the necessary appropriations, the board will first direct the construction of the additional locks, at situations where the present locks are defective, in order that they may be available while the others are being rebuilt. Provision for doubling the remainder, may be deferred till next session. The expense of those deemed proper to be doubled during the coming year, will be found among the estimates of appropriations.

In entering upon their duties, the board were not unmindful that

public opinion called for energy and prudence, in the management of the public works, and strict economy and accountability in the disbursement of the public funds. They have labored to effect this from time to time with earnest solicitude, and it may not be too much to say, that rigid accountability, strict integrity, and faithful performance of duty, have been required from all the agents employed upon the public works: many of their duties were rendered very arduous and were discharged with ability.

Repairs.

The amount of repairs made during the season, has been considerable. While adverting to repairs it is proper to state that they are of two kinds, ordinary and extraordinary, produced by two distinct causes. Ordinary repairs arise from the natural dilapidation and decay, incident to a large proportion of the material used in construction. The other cause of repair results from peculiar and unexpected combinations of the natural elements. This kind of repair during the past season has constituted a large item.

Philadelphia and Columbia Rail-way.

Length 82 miles; greatest elevation at the gap cut, 560 feet above mean tide at Philadelphia, and 323 feet above the basin at Columbia. It has an inclined plane near the eastern termination of the road, at Schuylkill, 2714 feet long, overcoming an elevation of 185 feet; and another near the western termination of the railway, 1914 feet long, overcoming an elevation of 90 feet, the grade of the road is varied, the maximum being 45 feet to the mile, a short distance on each side of the gap cut excavation. The flexures on the line of the road are also varied, the minimum radius of curvature, being 350 feet.

The whole of the southern track of the road is constructed with the common iron edge rail, adjusted on a cast iron chair which is based upon a stone block and fastened with bolts.

Sixty miles of the western part of the northern track, are of similar construction. The remaining portion of the northern track is partly a continuous stone sill, or curb, plated with iron, and partly a wooden rail plated with iron resting on wooden sleepers or cross ties.

Rail roads are materially subject to the effects of winters, like the last. Snow accumulates in the excavations to an extent sufficient to frustrate all efforts to keep the track clear, and open for use. But, in addition to this general objection, the first description of road above mentioned, is liable to others. At the disappearance of the snow, the ground being saturated with water, yields to the lateral pressure exerted by the engines and their trains, particularly on curves, and tends to displace the blocks and separate the rails. This kind of railway is liable to other derangement. Water, when the ground is fully saturated, finds its way under the blocks, and the trains passing over the road in this condition, give the rails an undulating surface.

This is the principal cause or ordinary repair upon that part of the Philadelphia and Columbia railway, that has been constructed with iron rails and stone blocks.

With a view of rendering the road more permanent, and bringing the repairs within a narrower compass, measures have been taken to procure locust cross ties, which are to be placed across the track where most needed, to prevent depression and obviate separation.

It is believed that rail roads constructed with iron rails resting on blocks or cross ties, of enduring material and firmly fixed, will require but little repair.

The structure of the Philadelphia and Columbia rail road, with the exception of the Eastern 22 miles of the Northern track, is very permanent at this time, and appears to promise great durability, there being no perceptible wear on the rail by the operations of the past seasons.

Extraordinary repairs on the road the past season, have been considerable. The capacity of the culverts was not sufficient to vent the water during freshets, and in consequence, whole superstructures of this kind, together with the embankments resting upon them, in some instances, were carried away by the floods.

The wooden superstructures of the bridges upon the whole road, are very permanent, and appear capable of resisting the action of engines and trains of any ordinary weight. The foundations and masonry of the piers of some of the bridges are very defective; to remedy which, it became necessary to construct buttress walls for their support, at considerable expense; they are not entirely completed, but when finished, will render the whole of these superstructures permanent.

When the road was constructed, a wooden superstructure, consisting of truss work, was placed across a ravine at Mauls, 550 feet wide. It is in a rapid state of decay, and will require to be superseded by an embankment in the early part of the next season. It is also proper to add, that the Eastern 22 miles of the Northern track will require to be renewed shortly, unless measures should be taken to avoid the Philadelphia inclined plane, in which case a part of it will be unnecessary.

The application of the use of mechanical, or animal, as a motive power, is a question that experience has so firmly settled in favor of the superiority of the former, that the board, agreeably to the provisions of the resolution, passed June 16th, 1836, authorised the proper officer on the road to contract for twenty locomotive engines, adapted to the use of mineral coal, in addition to the eleven authorised to be purchased by the act of the 28th day of January, 1836. They will be delivered during the winter and will be ready for the accommodation of the spring business.

Much dissatisfaction has heretofore existed in relation to the use of mechanical, as a motive power; arising, in the opinion of the board, from the insufficiency or inadequacy of the motive power to accommodate all the business, and the consequent neglect of the way trade, the want of a sufficiency of mechanical power to accommodate that very important part of the business of the road, induced the use of animal power by those interested, and caused unpleasant collisions.

The board are gratified in believing that all those interested in the way business will be fully satisfied, if they can be accommodated at all times with the power belonging to the state. Experience fully proves that true economy consists in keeping an ample supply of power on the road, and actuated by this belief, the board will, from time to time, adopt measures to have a supply of locomotive engines, adequate to any amount of business of every description, that will require accommodation.

The tolls derived from the use of motive power have not been quite equal to the expenditure in keeping it in operation, nevertheless, the prospect of doing so hereafter is encouraging.

The excess of expenditure above the receipts, amounts, from the first of March, to the 31st October, to	\$45,403 56
That of the preceding year,	53,695 21

By this, the board mean not the remotest imputation upon their predecessors, but wish merely to show, that as experience suggests changes in systems of discipline, and economy in the use of locomotive engines, there will be found an approximation toward bringing the expenditure within the limit of receipt. The advanced price of materials and labour produced a corresponding advance in expenditure, notwithstanding, a reduction in the excess will be observed. It is evident that if the advance in the price of materials and labour had not taken place, the motive power would have sustained itself within the above period.

Another fact is worthy of notice. The want of a sufficient number of engines and their deranged condition at the commencement of the season, rendered them generally unfit for business without undergoing heavy repairs. By reference to the report of A. Mehaffy, superintendent, a more particular detail relative to the road may be seen.

The following statement will show the receipts and expenditures from March 1st, to October 31st, 1836, in the motive power department.

Debts due, prior to March 1st, 1836,	\$53,695 21
Appropriation by act 17th March, for payment thereof,	47,219 26
Deficiency,	<u>\$6,475 95</u>
Whole amount paid since March 1st,	\$88,520 85
Deduct above deficiency,	6,475 95
Amount paid for motive power, since March 1st,	82,044 90
Debts outstanding,	40,945 30
Expense of motive power, from March 1st, to October 31st, 1836.	122,990 20
Motive power tolls, same period,	77,586 64
Deficiency,	<u>45,403 56</u>

A material diminution in the expense of maintaining the motive power, will take place by a concentration of making all repairs as far as practicable, at the central shop at Parkesburg. The location possesses many advantages; dwellings have been erected for the accommodation of the workmen. They are leased to them, and besides the investment being good, they always insure the presence of those engaged in making repairs. The board believe the exercise of sound economy requires that the Parkesburg shop should be enlarged, and the mechanical implements increased, so as to make it sufficiently capacitated to have performed all operations of the kind, necessary to be done on the road.

Another important diminution of expense will consist in avoiding the inclined planes.

John P. Bailey, engineer on the Gettysburg extension, was directed, when his other duties would permit, to cause to be made a survey with a view of avoiding the inclined plane at Columbia. The report and estimate have been made, and the board are gratified in being able to communicate to the legislature, that the plane can be avoided at a grade not exceeding thirty-five feet to the mile, and a diminished distance of six hundred feet, the length of the new line being six miles. Estimated cost \$112,404 44. As the cost falls within the limitation prescribed by the resolution passed June 16th, 1836, the whole line was directed to be placed under contract on the 30th November.

If early provision be made by the Legislature for the vigorous prosecution of the work, the inclined plane, which is so expensive to the state, may be dispensed with on the first of September next.—The board would also remark, in case the masonry and road way formation can be finished during the winter and spring months, that the removal of the superstructure from the present location to the new road way, can be done with least inconvenience during the interim that usually exists between the great press of spring and autumn business. Of the propriety and urgent necessity of this measure, there remains no doubt. By reference to the report of the superintendent of motive power, it will be seen that the annual expense of keeping the plane in operation and sustaining the animal power necessarily connected with it, amounts to the sum of \$17,490 00.

The surveys and examinations authorized by resolution of the same date, to ascertain the feasibility of avoiding the Schuylkill inclined plane, are in progress, and will be submitted to the Legislature so soon as all the facts are collected.

Portage Railway,

Connects the Juniata division with the Western division of the Pennsylvania canal. Length 36 miles. This road presents a mechanical power of novel character, having ten inclined planes, five on each side of the summit. They are numbered from Johnstown at the Western termination, towards Hollidaysburg at the Eastern termination.

The following table will show the length of each plane, and the elevation overcome by the use of stationary steam power.

No. of Plane.	Length in feet.	Elevation overcome.
Plane No. 1,	1607.74	150
" 2,	1760.43	132.40
" 3,	1480.25	130.50
" 4,	2195.94	187.86
" 5,	2628.60	201.64
" 6,	2713.85	266.50
" 7,	2655.01	260.50
" 8,	3116.92	307.60
" 9,	2720.80	189.50
" 10,	2295.61	180.52

The following table will show the length of each section of the road, and elevation overcome by the use of motive power.

	Distance in miles.	Elevation overcome in feet.
From Johnstown to foot of plane No. 1,	4.13	101.46
head of plane No. 1 to foot of plane No. 2,	13.06	189.58
Do. 2 to do. 3,	1.43	15.80
Do. 3 to do. 4,	1.90	18.80
Do. 4 to do. 5,	2.56	25.80
Do. 5 to head of plane No. 6,	1.62	19.04
Descending.		Descent.
From foot of plane No. 6 to head of plane No. 7,	0.15	level
Do. 7 to do. 8,	0.61	5.40
Do. 8 to do. 9,	1.18	12.00
Do. 9 to do. 10,	1.70	29.58
Do. 10 to Hollidaysburg,	3.72	146.71

As the superstructure of the portage railway is similar to that of the Philadelphia and Columbia railway, it was subjected to the same causes of heavy expenditure for repairs during the past season. The same remedy has also been applied—that of introducing locust cross ties. The road is acquiring permanency.

Supplies of water, for the stationary and locomotive engines, at planes 2, 3, and 9, which had heretofore been procured principally from wells, were found insufficient. To remedy which, 13,340 feet of wooden pipe have been laid during the season, by which an abundant supply is obtained.

Operations connected with the repairs and improvements of the road, have been conducted with the view of increasing its strength and permanency.

The motive power department, although complicated, has been managed during the past season with entire success. Cars were transported with promptness and great safety. But one serious ac-

cident took place, which occurred thus: The rope, and the surface of the rails being covered with a heavy frost, the hitches and safety cars slipped, and the cars were precipitated with great velocity down the plane. An improvement has since been made in the safety car, which has induced complete confidence in this most valuable contrivance.

The Portage railway, however complicated in its operations, and limited in capacity by inclined planes, as canals are by locks, is, nevertheless, adequate to the transaction of a vast amount of business. Occupying as it does a nearly central position on the main line between Columbia and Pittsburg, the capacity of the planes ought to be equal to that of the locks on those divisions. Many suppose the planes fall very far short of that limit, and that their full capacity is nearly reached.

It is however due to our commercial interest and the public at large, to state, that the maximum of that limit is very far from being attained. The length of the longest plane is about 3,000; the time occupied in moving up or down it, is five minutes; the time occupied in attaching is two and one half minutes; making seven and one half minutes, or eight drafts per hour of three loaded cars, carrying three tons each, making twenty-four cars or seventy-two tons per hour.

It will be observed by the report of the superintendent, that the number of cars weighed at Hollidaysburg and transported from east to west, from April 1st, to October 31st, is 14,390, making a transit of a number not exceeding a hundred per day; but, instead of this number, when the trade demands it, twenty-four cars can be passed up and the same number down the longest plane in each hour, making two hundred and eighty-eight cars in the day of 12 hours, or five hundred and seventy-six, in one direction in twenty-four hours: this can be accomplished by using the road day and night, by means of a double set of hands. This is the true limit of the capacity of the road.

In the opinion of the board, locomotive engines ought to be placed on that part of the road between Johnstown and foot of the plane No. 1, and also on that part between Hollidaysburg and foot of plane No. 10, so soon as the workshop at that place is finished. There are locomotive engines on the Philadelphia and Columbia railway, not very well adapted to the great length of that road, which would, in the opinion of those experienced in that subject, be very well fitted to shorter lines. These locomotives will be placed on the section of the Portage road next to Johnstown, for the accommodation of the spring business, and on the other, so soon as the necessary fixtures can be completed. Advantages will result from this measure, not only in a pecuniary point of view, but it will give increased expedition in the transit of passengers and merchandize. The superintendent entered into contract, during the season, for an entire set of new ropes of much greater dimensions and strength than any heretofore used. They are expected to be ready for the opening of the spring business.

Motive Power—Receipts and expenditures.

1 Whole amount paid by superintendent,	\$ 77,436 05½
2 For ropes out of appropriation by act February 18th, 1836,	19,506 86
	<hr/>
	\$ 57,929 19½
Estimated debt outstanding,	16,000 00
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Expense of motive power from April 1st, to October 31st,	\$ 73,929 19½
Motive power tolls collected at Johnstown, from April 1st, to October 31st,	\$ 29,976 37
Do Hollidaysburg,	44,375 26
	<hr/>
	74,351 63
	<hr/>
Excess of tolls above expenditure,	\$ 422 44½
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Main Line of Canal.

The navigation of the main line has been very good. The supply of water was abundant during the whole season, considering the circumstances under which the navigation opened in the spring, there has been comparatively, little interruption from breaches.

The greatest interruption occurred at the entrance of the Eastern Division. A derangement of the dam was occasioned by the spring freshets, and when the flood subsided, a full level of water could not be kept up.

The location of the canal, just below Duncan's Island, having necessarily been made across a belt of rocks, but which were not originally blasted or excavated to the common level of the bottom of the canal, made the passage difficult, and to the heavier class of boats impracticable. Measures have been taken to have the rock excavated during the winter. The bridge at Duncan's Island continues to be a source of vexation and apprehension. The board are of opinion that the construction of a new bridge is the best remedy that can be adopted; all efforts to repair the present disjointed structure in a substantial manner, will prove unavailing, and a different location will prove beneficial in another respect. The western abutment of the present bridge affects the outlet of the Juniata Division into the Susquehanna, and causes continual expense in keeping it clear of deposite, and a correspondent effect is produced by the eastern abutment upon the entrance into the Eastern Division of the Susquehanna. If the bridge were located higher up the river, this difficulty would be obviated, and the influence of the current of the dam in towing boats across, in a great measure escaped.

Notwithstanding the increasing solidity of the canal banks, the inner sides of them require lining. They were peculiarly exposed during the present season. The ground which was penetrated to a great depth with the frost, became extremely porous when it was ab-

stracted. The lateness of the season, and the anxiety of transporters, induced the admission of the water before the banks were sufficiently settled. This rendered them more liable to wear by the friction of wave, produced by the speed of the packet boats.

Much of the material used in the original construction of bridges, aqueducts and lock gates is decayed. The supervisors along the main line have renewed them to a considerable extent during the season, and have procured sufficient quantities of materials to replace and renew during the winter, portions that could not be done during the navigable season.

The masonry of some of the locks on the Western Division is becoming very much delapidated, and must be rebuilt.

Delaware Division.

Navigation was obstructed on this division during nearly the whole of April; a great freshet occurred on the tenth of that month; the waters rose to a height sufficient to overflow the canal banks; the current swept away whole sections of the outer bank, a distance of several hundred yards. The water was re-admitted about the 25th, from which time the navigation was interrupted but little.

Considerable repairs of farm and road bridges are becoming necessary on this line. The population of that part of the state is dense, and therefore the bridges are considerable in number. Repairs have been made, and more will be necessary during the next season. This division, as a part of the system, is beginning to assume an important position, and will, without doubt, produce most valuable results. Its connection with the Lehigh canal and the rail ways that ramify to the coal beds bordering on the sources of that river, must insure it a vast amount of tonnage. The present prices and demand for anthracite coal, are evidences that this division will produce a large amount of tolls the next season. It is a matter very much to be deplored, that the capacity of the locks on this division were not, in the original construction, made similar to those of the Lehigh. Locks on the Delaware are 11 feet, on the Lehigh 22 feet wide. Evidences of the future utility, and of the present incapacity of this work, are so strong, that provision will have to be made at no distant period, for doubling its locks, or increasing them to a width corresponding with those of the Lehigh.

Susquehanna, North and West Branch Division.

The Susquehanna, and North and West Branch divisions, all shared in the general injury by the freshet, about the 10th of April. The navigation of all those divisions was suspended about three weeks. Strong currents were produced in the canal by the water, making breaches through the towing path side of the canal from the river thence sweeping down it, and again breaking out of the canal. Much injury by wear was also done to the inner side of the banks. After those injuries were repaired, those divisions continued in good navigable order during the season, with the exception of an interruption that occurred on the West Branch at Pine creek. Navigation from the

point to Loyalsock creek, a distance of 20 miles, was suspended, from June 21st, to October 16th, by the failure of Pine creek aqueduct; it was materially shattered by the freshet of April, operating on the foundation, and the succeeding freshet in June, undermining the piers, produced the disaster. The aqueduct has been rebuilt with a diminished number of piers, and increased depth of foundation; and it is believed, that with the assistance of piling, they will be rendered very permanent, and placed beyond the influence of freshets.

The locks on the North Branch are constructed of wood and are somewhat decayed; but it is believed, with a little repair they can be made to answer the purpose of navigation, two years longer.

A new guard lock will be necessary at the Nanticoke dam, next season. It is indispensable to the safety of the canal.

The attention of the board was directed by the resolution of June 16th, 1836, to the expediency of providing additional feeders for the supply of the canal from Nanticoke to Northumberland. They think it most advisable at present not to commence the construction of feeders. If the dam at Nanticoke be kept well gravelled, a sufficient supply of water can be obtained, and they report accordingly.

The West Branch division will soon receive an addition to its length of 7 miles and 112 perches, that being the length of the Tangascootack extension. It would have been completed at this time, but for the unfavorableness of the season. The work will be finished in the early part of next season, and will then be placed under the charge of the supervisor.

Estimated amount of work done,		\$108,240 77½
“ “ required to complete,		117,720 00
Estimated cost,		225,960 77½
Appropriation, April 13th, 1835,	\$80,000	
Do. February 15th, 1836,	112,017	
		192,017 00
Appropriation yet required,		\$33,943 77½

Beaver and French Creek Divisions.

These canals, especially the French Creek, were almost destroyed by the great freshet of 1835 and succeeding floods. The alternatives were presented of repairing them at a very large expense, or suffering them to go to entire ruin. The board could not hesitate to adopt the former, and directed substantial repairs to be made. These are nearly completed, and it is believed they are of such a permanent nature, as to prevent a recurrence of serious injuries to these canals.

The report of Mr. Whippo, the principal engineer, will point out the nature and extent of these injuries and the kind of repairs.

Surveys and Extensions.

In accomplishing the duties enjoined by the last legislature, in relation to exploratory surveys, and surveys with a view of placing work

under contract, the board were solicitous in the first place, to procure gentlemen of science and experience in the profession of engineering, to take charge of those important trusts, and they are gratified in stating that they have succeeded in the selection of principal engineers, in whom entire confidence may be placed.

The surveys, in some instances, were slightly retarded, in consequence of the difficulty in obtaining assistant engineers. The cessation in the progress of the public works, during the preceding year, and the recent impulse to improvement in the southern and adjoining states, induced many that had been engaged in the service of this state, to leave it.

North Branch Extension.

James D. Harris, principal engineer, was appointed to take charge of the North Branch extension. His duties were also extended to the Tangascootack extension, and the finished lines comprising the Susquehanna and North and West Branch Divisions. Operations were commenced as soon as it was practicable to organize a party, and make the necessary arrangements with the view of carrying into effect the intention of the legislature relative to the North Branch extension to the New York state line. A general reconnoissance of both sides of the river, from the mouth of the Lackawannock to the northern boundary of the state, was made with sufficient accuracy to constitute data for the purpose of making estimates.

The location recommended by the Engineer, commences at a dam to be erected on the Chemung river, near the village of Athens, (Tioga point,) passes down the west side of the Chemung and Susquehanna rivers, to the town of Towanda, crosses the river at that place by a dam, and continues down the eastern side of the river to the present termination of the North Branch Division at the mouth of Lackawannock creek. Of this location the board approved, and authorized to be put under contract 35 miles, commencing at the dam near Athens and terminating at Wyalusing creek.

The letting took place on the 25th October. The contract prices are higher than heretofore, caused by the high prices of labor and provisions. The construction of this canal is difficult. There is much bold and precipitous bluff ranging along the margin of the river.

The whole length of the extension from Athens to Lackawannock creek, 89 miles and 14 chains. Estimated cost, \$2,923,294 99.—Whole lockage, 188 feet.

Estimated cost of that portion under contract, styled the Tioga line of the North Branch extension, \$1,274,489 68. Lockage, 74 feet.

The citizens of New York, who reside along the improvements of that state, stretching from Albany to Lake Erie, from Salina on the "Grand Canal" to Lake Ontario, from Utica to Binghamton, and from Montezuma, another town on the "Grand Canal," through Seneca lake to the Chemung river, within a few miles of the Pennsylvania line, looked with intense anxiety to the point where it should be determined to commence the extension.

In view of this important fact, and to afford equal facilities to all the improvements, that are intended to debouch into the North branch, from New York; and for the purpose of securing a connexion with the works of that state, adequate to the immense business which must float on the united improvements, it was thought best to commence at Athens. This course also seemed to be pointed out by the words of the act of assembly on the subject.

The board would recommend that every facility, by the legislature, be extended to those interested in the construction of the works alluded to, which may be necessary to the attainment of their object.

The following statement will show the amount remaining in the treasury, and the amount disbursed on the Tioga line, North branch extension.

Amount appropriated by act 18th February, last,	\$150,000 00
Amount drawn by the superintendent,	50,000 00
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Balance in the treasury,	\$100,000 00
	<hr/>
Amount drawn by superintendent,	\$50,000 00
Amount disbursed by superintendent,	3,086 11
	<hr/>
Balance in the hands of superintendent, Oct. 31st, 1836,	<u>\$46,913 89</u>

Erie Extension.

Charles T. Whippo, principal engineer, was appointed at the same date, to take charge of the Erie extension, and the experimental survey for a rail road from Freeport, by way of Butler, to New Castle; and also of all the finished lines of canal west of the Allegheny ridge. He was instructed to proceed, with as much expedition as possible, to commence the surveys; and after the necessary arrangements were made, the surveys were commenced at the head of the New Castle pool, and continued up the Shenango branch of the Beaver, to the Conneaut summit. The board proceeded, about the first of August, to give the route and country a personal examination, and subsequently directed the engineers to prepare for contract, $45\frac{1}{2}$ miles, commencing at the head of the New Castle pool and extending northward to the junction of Little Shenango and Crooked creeks. These $45\frac{1}{2}$ miles were put under contract on the 6th day of September. He was also directed to make surveys from Conneaut summit to the harbour at Erie.

Surveys and estimates of the Eastern and Western routes have been made, reports of which are herewith transmitted.

The extension of the canal to the barbour at Erie, was a part of the original plan for improving the state, and was proposed to the people at the commencement of the system, and generally sanctioned by them. The importance of the completion of this work, has been often urged upon the legislature, and the absolute necessity and propriety of having it speedily completed, as often conceded.

It would therefore seem just and politic, that the legislature should make such liberal appropriations as would ensure its early completion.

The 45 miles under contract are estimated to cost,	\$837,932 77
Continuation to near Conneaut lake, $14\frac{1}{2}$ miles,	381,742 79

Erie extension from New Castle to Conneaut lake,	\$1,210,675 56
Whole lockage 284 $\frac{1}{2}$ feet.	

Estimated cost of Western route from Conneaut lake to harbour at Erie,	\$1,533,971 05
Lockage 506 feet—distance $45\frac{5}{8}$ miles.	

Estimated cost of Eastern route from Conneaut lake to harbour at Erie,	\$2,008,193 44
Lockage 763 feet—distance 71 miles.	

The following statement will show the amount remaining in the treasury, and the amount disbursed, on the Shenango line, Erie extension, out of the appropriation of 1836.

Amount appropriated by act 18th February, last,	\$200,000 00
Amount drawn from the treasury,	5,000 00

Balance in the treasury,	\$195,000 00
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Amount disbursed by superintendent,	\$9,018 95
Amount drawn by the superintendent,	5,000 00

Amount due superintendent by the commonwealth,	\$4,018 95
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John P. Bailey, principal engineer, was appointed to take charge of the Philadelphia and Columbia railway, the Portage railway, the line of canal connecting those railways, and of the Delaware division.—He was subsequently appointed to take charge of the Gettysburg extension of the Pennsylvania railway.

The State of Maryland having passed the requisite laws, and the Baltimore and Ohio rail road company having consented to a "satisfactory connection of their road with the Gettysburg extension of the Columbia rail road." The board caused to be located and put under contract twenty-two and a half miles of said road, beginning at the borough of Gettysburg, and extending to the summit of the south mountain. It appears by the report of the engineer, that this road will be embarrassed by no inclined planes. The work is deemed of great importance to Pennsylvania. The link from Gettysburg to Hagerstown, is all which it is necessary for the state to make, to complete a continuous chain of rail road from Philadelphia to Pittsburg and Wheeling. A company has been chartered and is already in active operation to make the part which lies between the termination of the Columbia rail road at Wrightsville and Gettysburg.

The right to have transported on the Baltimore and Ohio rail road, the persons and things passing to or from the Pennsylvania road, together with a fixed mode of charging toll thereon, is secured to this

state by an act of the last legislature of Maryland, and assented to by the Baltimore and Ohio rail road company.

Thus, by the expenditure of but little more than one million of dollars, Pennsylvania will have the use of a work which will probably cost eight or ten million more. The engineers of the Baltimore and Ohio rail road company have ascertained that no inclined plane will be necessary between Hagerstown and Pittsburg, and Wheeling. When, therefore, the improvements on the Columbia and Philadelphia rail road now in progress shall have been completed, Philadelphia will be connected with the Ohio river, by a rail road crossing the Blue ridge and Alleghany mountains without an inclined plane, or an elevation in any part higher than 50 feet to the mile. Its southern location will secure it against obstruction by snows. It is believed to be the shortest practicable route for a rail road from Pittsburg and Wheeling to Philadelphia. Its advantages must be immense to Philadelphia and Pittsburg, as well as other parts of the state, by affording a speedy transportation of passengers and freight at all seasons of the year, and especially while the canals of this and adjoining states are locked up with ice.

The letting for the grading and roadway formation took place on the 6th of October. The work was let at fair prices.

Length of the whole line from Gettysburg to Hageratown	41 $\frac{3}{4}$ miles.
Estimated cost of grading the whole line,	\$754,700 23
Estimated cost of grading the 22 $\frac{1}{2}$ miles under contract,	478,079 99
Estimated cost of laying 41 $\frac{3}{4}$ miles single track iron-edge rails,	399,019 78

The following statement shows the amount remaining in the treasury, and the amount disbursed on the Gettysburg extension.

Appropriated by act 18th February last,	\$200,000
Amount drawn by the superintendent,	50,000
	<hr/>
Remaining in the treasury.	\$150,000
	<hr/>
Amount drawn by the superintendent,	\$50,000 00
“ disbursed by do	2,253 57 $\frac{1}{2}$
	<hr/>
“ in hands of superintendent,	\$7,746 42 $\frac{1}{2}$
	<hr/>

Exploratory Surveys.

Amongst the proposed surveys by the act of the 18th February, 1836, was that for ascertaining the practicability of canal, or rail way communication from the West Branch to the Allegheny river. Accordingly, B. Ayerigg, principal engineer, was detailed for that important purpose, with full powers to make a thorough and accurate examination. After organizing his party, he directed his energies to running transverse lines to ascertain the lowest point or gap in the barrier, dividing the waters of the West Branch and Allegheny. The

party are still in the field, but will close that part of their duty shortly. The report will be submitted as soon as it is prepared.

The board was directed by the same act to cause a survey to be made from Lewistown to water street. Mr. Charles De Hass was detailed for the purpose, who, after completing that survey, was directed to make a survey required by the act of April 2d, 1836, from the base of Laurel Hill, near Laughlinstown, by way of Greensburg, to Pittsburg.

Mr. De Hass was subsequently instructed to make a survey of the Allegheny mountain, with the view of ascertaining the practicability of avoiding the inclined planes, in accordance with the resolution on the subject.

This corps of engineers are now engaged on the mountain. Their duties have kept them so unremittingly in the field, that no reports and estimates have been made; they will be prepared and submitted soon after the meeting of the legislature.

It will be observed by a former part of this report, that the survey of a line of rail road from Freeport, by way of Butler, to New Castle, was embraced amongst the duties devolved upon Charles F. Whippo. The survey has been made, and the report and estimate will be laid before the legislature, so soon as they can be prepared by the engineer.

Reservoirs.

The reservoirs at Hollidaysburg and Johnstown have not been placed under contract: the subject, after consideration, was delayed until after the completion of the surveys of the Alleghany mountain, for the avoidance of the Portage planes. The result of the survey and its effects upon the present terminations of the Western and Juniata divisions could not be foreseen. In case the avoiding of the inclined planes should be discovered to be practicable, under warrantable circumstances, and the present terminations of the Portage rail way remain unchanged, the board concur in the opinion expressed by the former board, that the construction of the reservoirs will become necessary.

Retained per centage.

Many cases of retained per centage have been decided and liquidated, as they have been presented by those interested. A large proportion of them remain unsettled.

The amount paid by the decision of the board during the year, amounts to \$10,690.

Referred Claims.

The cases of claims against the state, which were referred to the board by resolutions of last session, are either settled, or in progress of investigation, as those that have been settled were paid out of different funds they will be included in the proper place in the following tables.

The following table will show the amount drawn from the treasury, for the repair of canals and rail ways, from the 1st of March, to the 31st October, 1836, and for the payment of old debts for that object.

Philadelphia and Columbia rail way,	\$57,205 05
Portage rail way,	15,000 00
Delaware division,	32,748 98
Eastern division, (including 13 miles Juniata,)	18,029 16
Juniata division,	30,637 89
Western division,	28,591 35
North Branch,	12,500 00
West Branch,	32,248 50
Beaver division,	29,331 15
French creek,	20,906 00
Susquehanna division,	5,000 00
	<hr/>
	<u>\$282,198 08</u>

The following table will show the amount drawn for repairs from October 31st, 1835, to March 1st, 1836, including the difference between the above sum of \$282,198 08, and \$300,000 00 the repair fund of last year.

Columbia railway,	\$8,258 91
Portage do	954, 81
Delaware division,	2,525 16
Eastern do	1,942 77
Juniata do	4,611 80
Western do	2,467 26
North branch,	1,121 13
West do	3,464 43
Beaver division,	1,873 19
French creek,	6,570 80
	<hr/>
	<u>\$33,790 27</u>

The following table will show the amount paid for damages from October 31st, 1835, to October 31st, 1836.

Eastern division,	\$1,705 00
North branch,	686 00
Beaver division,	2,718 31
Philadelphia and Columbia railway,	17,685 00
Western division,	6,394 50
West branch,	9,112 50
Juniata,	2,250 00
French creek,	9,609 00
Portage railway,	650 00
Delaware division,	250 00
	<hr/>
	<u>\$51,060 31</u>

The above sum \$ 20,576 81, was drawn from October 31st, 1831, to March 1st, 1836, and \$ 30,483 50, from March to October 1st.

The following statement shows the amount drawn from the treasury and applied to the objects specified, from March 1st to October 31st.

Debts due on finished lines,	\$ 20,727 08
Damages—Grant's hill,	9,677 38
New work on finished lines,	10,083 12
Exploratory surveys,	6,500 00
Locomotive engines,	55,855 50
Ropes—Philadelphia and Columbia rail road,	3,390 00

Appropriations.

The board recommend the following appropriations for the current year.

For payment for twenty locomotive engines, enlarging Parksburg shop, mechanical implements, and ropes for inclined planes,	\$ 164,500 00
For new work on finished lines, pay of canal commissioners and appraisers,	25,000 00
For payment of damages,	20,000 00
For repairs of canals and railways,	300,000 00
To commence doubling locks on the Eastern division, Susquehanna,	30,000 00
For new bridge, Duncan's Island,	60,000 00
To complete the line of railway to avoid the inclined plane at Columbia,	87,500 00
To complete the Tangascootack extension,	33,943 00
To restore deficiency in motive fund, occasioned by payment of old debts,	6,476 00
For ropes on the Portage railway,	20,000 00
	<hr/>
	\$ 747,419 00
	<hr/>

To carry on the work put under contract by authority of the act of 18th February, last, the following appropriations will be necessary during the current year.

Tioga line, North branch extension,	\$ 400,000 00
Erie extension,	400,000 00
Gettysburg extension, rail road,	280,000 00
	<hr/>
	\$ 1,080,000 00
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These sums will not complete the works under contract, but will enable the contractors to keep upon the sections a reasonable force until the commencement of the next season.

It is the opinion of the board, that the best interests of the commonwealth, and a regard for her good faith, absolutely demand these appropriations.

h in the year, ending 31st October, 1836;

APRIL.			MAY.		
Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	
Philadelp ^h					
Dow					
Lanc ^h	1,994 34	\$4,846 98		\$10,281 87	\$7,429 07
Colu ^m	862 08	215 29		423 54	77 72
Port ^l	1,904 36	893 88		1,598 97	980 97
Harr ^l	1,563 56	941 42		832 22	411 49
New	325	1,000		3,002 05	2,913 76
Lewi ^s		87,213 54			
Hunt ^l		11,783 93			
Holli ^s		3,440			
John ^s		680			
Blair ^s		2,310 71			
Leec ^h		1,000			
Pitts ^l		5,175 44	6,145 19		5,048 25
Beav ^l		9,966 69	2,421 93		3,469 05
Frank ^l		200			
Liver ^p		535			
North ^l		3,054 64			
Dunn ^l		45			
Berw ^l		168 88			
Easto ⁿ		515			
New ^l					
Bristo ⁿ					
Colu ^m		197 51			
Port ^l					
Do		790			
Bridge ^l					
Schu ^l		19 12			
Aque ^l		110 42			
Do		208 19			
Do	35 99				
Do		13 80	68 16		
		26			
		215			
85 53	\$7,897 57	\$47,668 87	\$24,773 93	\$20,350 51	

The above sum \$20,576 81, was drawn from October 31st, 1831, to March 1st, 1836, and \$30,483 50, from March to October 1st.

The following statement shows the amount drawn from the treasury and applied to the objects specified, from March 1st to October 31st.

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Locomotive engines,	55,855 50
Ropes—Philadelphia and Columbia rail road,	3,390 00

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For payment of damages,	20,000 00
For repairs of canals and railways,	300,000 00
To commence doubling locks on the Eastern division, Susquehanna,	30,000 00
For new bridge, Duncan's Island,	60,000 00
To complete the line of railway to avoid the inclined plane at Columbia,	87,500 00
To complete the Tangascootack extension,	33,943 00
To restore deficiency in motive fund, occasioned by payment of old debts,	6,476 00
For ropes on the Portage railway,	20,000 00
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	\$747,419 00
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To carry on the work put under contract by authority of the act of 18th February, last, the following appropriations will be necessary during the current year.

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Erie extension,	400,000 00
Gettysburg extension, rail road,	280,000 00
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	\$1,080,000 00
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These sums will not complete the works under contract, but will enable the contractors to keep upon the sections a reasonable force until the commencement of the next season.

It is the opinion of the board, that the best interests of the commonwealth, and a regard for her good faith, absolutely demand these appropriations.

Statement showing the amount of Tolls collected at each Collector's office upon the Pennsylvania Canal and Railway, and paid into the Treasury during each month in the year, ending 31st October, 1836;
also the Toll collected for Motive Power.

OFFICES.	NOVEMBER.			DECEMBER.			JANUARY.			FEBRUARY.			MARCH.			APRIL.			MAY.		
	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.
Philadelphia,		\$4,673 42	\$1,606 53		\$6,096 44	\$2,429 06		\$2,517 45	\$1,022 71		\$1,047 59	\$482 41		\$1,620 40	\$953 56		\$11,994 34	\$4,846 98		\$10,281 87	\$7,429 07
Paoli,		455 47	92 53		234 66	45 34		504 02	65 57								862 08	215 29		423 54	77 72
Downingtown,		1,181 83	698 53		649 97	433 14		1,219 16	708 86								1,904 36	893 88		1,598 97	980 97
Lancaster,					832 51	470 27		980 66	598 95								1,563 56	941 42		832 22	411 49
Columbia,			4,500	\$3,500	6,000			3,000	2,500		1,400	1,000		834 26	476 14		325	1,000		3,002 05	2,913 76
Portsmouth,	\$7,806 31			807 63												\$10,468 26					
Harrisburg,	2,856						\$1,800									788			11,783 93		
Newport,	281 48			412 38												19			680		
Lewistown,				1,012 44															2,310 71		
Huntingdon,							039												1,000		
Hollidaysburg,		5,441 42	2,968 24		3,362 33	1,464 80		3,858 12	739 91										5,175 44	5,145 19	5,048 25
Johnstown,			717 25	7,000		300		1,074 21	\$3,500										9,966 69	2,421 93	3,469 05
Blairsville,																			200		
Leechburg,	227 95			306 19												24 70			335		
Pittsburg,							2,809 62												3,054 64		
Beaver,	1						60			8 56						1 15			45		
Franklin,													\$75								
Liverpool,	185															254 03			168 88		
Northumberland,				1,630			847 56			79 03				\$7 28		127 47			515		
Dunnstown,	382 27			610 75																	
Berwick,							1,853 94														
Easton,				2,631 98																	
Newhope,	648 55			594 60			8 65														
Bristol,				1,082 09																	
Colombia outlet locks,							20 75									787			790		
Portsmouth do.	20 62						18									2 25					
Do. bridge, Swatara,	32 44			32			55 36			32			36 50			34 82			19 12		
Bridge, Duncan's Island,				182 29			528 22			242 11			122 75			419 29			110 42		
Schuylkill viaduct,		84 66						57 76											208 19		
Aqueduct, Duncan's Isl.													11 11			23 35			13 80		
Do. Jack's Narrows,													22 54								
Do. Kiskeminetas,							52 64									58 16			26		
Do. Pittsburg,							229 86									282 04			215		
	\$12,441 62	\$11,836 82	\$10,483 08	\$23,551 35	\$17,175 91	\$5,142 01	\$8,915 20	\$12,117 17	\$6,710 21	\$3,861 70	\$2,447 59	\$1,482 41	\$1,939 65	\$3,454 66	\$1,729 70	\$13,440 71	\$16,683 53	\$7,897 57	\$47,668 87	\$24,773 95	\$20,330 31

Statement showing the amount of T. 44. 18

DEBIT		CREDIT	
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—Continued
 at of Tolls

Page 25.

Motive power.		TOLLS.		Motive power.	
86,288 38				839,788 48	
164 78	8 48			1,136 19	
412 47	9 56			6,730 87	
255 07	9 53			3,288 47	
	9 62			40,025 61	
	7 22				
6,052 81					
3,851 03	9 44			48,386 11	
	9 78			25,825 81	
817,024 49		86			
		63		8166,281 04	

to the 1st of January next.

Statement showing the amount of Tolls collected, &c.—Continued.

OFFICES.	JUNE.			JULY.			AUGUST.			SEPTEMBER.			OCTOBER.			TOTAL FROM EACH OFFICE.		
	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.	Canal tolls.	Railway tolls.	Motive power.
Philadelphia,		\$9,001 45	\$3,658 52		\$6,084 67	\$2,276 67		\$14,326 29	\$6,288 38		\$10,253 03	\$4,719 13		\$8,861 55	\$3,850 40		\$86,788 45	\$39,788 49
Paoli,		427 06	93 54		371 27	83 49		493 89	164 73		356 42	162 22		441 15	133 76		4,369 56	1,136 19
Downingtown,		549 78	566 92		1,593 84	1,102 71		609 76	412 47		965 44	662 92		666 42	469 97		10,939 53	6,730 37
Lancaster,		448 73	276 53		443 77	300 80		477 91	255 07		556	367 29		470	290 59		7,419 62	3,288 47
Columbia,	\$12,900	9,870	4,001 88	\$11,297 73	11,707 61	9,345 61				\$10,907 11	9,285 75	4,196 28	\$12,953 07	12,676 84	10,268 13	\$58,751 45	58,287 22	40,025 61
Portsmouth,	5,761 61			7,168 24			\$6,183 93			7,330 84			11,929 48			69,239 23		
Harrisburg,	4,830 85			2,818 20			3,220 23			3,664 56			3,749 44			27,167 28		
Newport,	2,080 11			1,140 11			592 05			926 27			361 83			6,474 50		
Lewistown,	1,927 17			1,626 77			452 46			477 26			998 80			8,779 61		
Huntingdon,	1,000			500			400			450			400			4,380		
Hollidaysburg,	3,352 58	12,259 76	10,309 63	6,586 24	5,600 91	5,581 49	6,138 59	7,350 73	6,052 81	7,618 92	5,500 70	6,598 65	6,347 04	12,334 27	9,622 33	37,018 81	61,539 44	48,386 11
Johansstown,	19,250 19	3,103 25	4,548 75	10,374 97	3,190 12	4,135 11	9,304 64	2,776 24	3,851 65	11,267 83	2,941 01	4,101 87	11,528 44	2,687 43	3,628 54	82,023 06	17,119 78	25,825 81
Blairsville,	250			200			200			150			300			1,300		
Leechburg,				850			200									2,142 84		
Pittsburg,	5,211 31			5,871			5,302 34			4,366 20			9,091 85			35,706 96		
Beaver,	20			113 11			55			30			170 56			504 38		
Franklin,	71 26			185 57			56 50									588 33		
Liverpool,	400			397 52			260			150			571 96			2,087 39		
Northumberland,	3,017 99			3,344 72			2,016 95			1,951 58			1,974 47			15,541 85		
Dunstown,	600															1,493 02		
Berwick,	673 71			930 14			751 99			1,061 17			918 74			7,824 16		
Easton,	7,325 30			5,767 53			8,186 08			7,639 49			7,701 45			43,338 35		
Newhope,				551			450			450			600			3,302 80		
Wristol,	1,297 07			1,460 47			1,157 05			1,814 66			1,945 81			10,534 15		
Columbia outlet locks,				47 25									39 46			109 71		
Portsmouth do,	38			60									22			177 74		
Do. bridge Swatara,	142 04			96 14			76 40			75 74			77 62			801 48		
Bridge Duncan's Island,	196 92			269 30			219 02			113 59			252 51			2,701 79		
Schuykill viaduct,		132 63			93 61			189 58			142 40			124 53		929 36		
Aqueduct Duncan's Island,				19 41									18 88			86 55		
Do. Jack's Narrows,																22 54		
Do. Kiskeminetas,	22			30 45			24			27 56			26			266 61		
Do. Pittsburg,	255			196			240			220			171 25			1,789 15		
	\$72,653 21	\$35,772 64	\$23,225 71	\$61,695 97	\$27,085 80	\$22,827 88	\$45,465 23	\$26,260 41	\$17,024 49	\$60,712 38	\$30,000 72	\$20,808 56	\$71,650 66	\$38,262 21	\$28,263 60	\$424,561 05	\$246,963 63	\$166,281 04
																246,963 63		
																166,281 04		
																\$837,805 72		



The question of further appropriations, for the current year, can best be decided by the legislature, in view of the importance of the early completion of these line, and the means at the disposal of the commonwealth. If the board be authorised to place an additional length of work under contract, the final completion of the whole, and the connexion of the present detached portions, which is so desirable, will thereby be hastened. In case this course be adopted, it is respectfully suggested, that the power be given to select, and put under contract, such portions of the proposed lines, as will require the longest time in construction.

The annexed tables contain statements, showing the amount of tolls collected at each collector's office, in each month of the year, ending October 31st, 1836; also the amount and kinds of property shipped upon the Pennsylvania improvements, during the same period.

Table No. 1, relates to tolls collected.

Table No. 2, exhibits a statement of the property shipped westward from the different offices.

Table No. 3, exhibits a statement of the property shipped eastward from the different offices.

Table No. 4, exhibits a statement of the property shipped southward.

Table No. 5, exhibits a statement of the property shipped northward.

Before closing this report, the board deem it proper to add, that at many situations along the lines of canal and slackwater, persons are desirous to have the use of the water power connected with the public works, on terms to be stipulated between them and the agents of the state. Hitherto it would seem that the legislature had deemed it unadvisable to authorize the sale or lease of water power, partly because such grants might possibly embarrass the operations of the public works, or interfere with contingent improvements. It is believed that on the old finished lines, a large amount of water power could be disposed of, under prudent restrictions, without interfering with, or impeding their navigation; and to the mutual advantage of the state and individuals, could the many valuable scites be occupied by factories, they would necessarily induce a large additional transportation on the works.

There remain a number of cases in which the state has the occupancy of lands for lock houses and other purposes connected with the improvements, which lands, being held as life estates and other lesser interests, by the former occupants, they were incompetent to make sufficient deeds to the commonwealth, and have therefore received no compensation. The board are not aware of the existence of any law by which such claims could be temporarily or finally settled, and would therefore respectfully submit the matter to the legislature.

Signed by order of the board,

MOSES SULLIVAN, *President.*

Attest—E. F. PENNYPACKER, *Secretary.*

TABLE No. 2.

Exhibiting a statement of property shipped Westward from Philadelphia and intermediate offices.

ARTICLES.		Philadelphia.	Intermediate offices.
Flour,	barrels	3,617	472
Wheat,	bushels	6	836
Corn and other grain,	do.	3,278	2,615
Clover and other grass seeds,	do.	63	116
Potatoes,	do.	124	509
Salted pork,	barrels	333½	216
Bacon,	pounds	13,840	18,041
Fish,	barrels	3,926	35,679
Butter and cheese,	pounds	20,593	32,828
Lard and tallow,	do.	4,285	9,098
Salt,	bushels	27,990	199,549
Provisions not specified,	pounds	12,341	378,764
Feathers,	do.	2,479	2,480
Wool,	do.	244,661	375,533
Cotton,	do.	381,733	14,217
Hemp,	do.	532,501	791,284
Tobacco,	do.	100,963	381,529
Leather,	do.	117,869	356,133
Raw hides,	do.	447,673	1,220,676
Furs and peltry,	do.		1,232
Whiskey and domestic spirits,	gallons	16,009	199,478
Merchandise,	pounds	19,896,986	25,076,875
Groceries,	do.	10,643,651	9,052,215
Oil,	gallons	44,803	97,592
Drugs and dye stuffs,	pounds	275,115	1,156,843
Gypsum,	tons	943.5	7,705
Furniture,	pounds	981,479	1,637,016
Window glass,	boxes	1,613	22
Rags,	pounds	415,020	2,410
Mineral coal,	tons	1,445.1	318
Iron ore,	do.		8,615
Iron pigs and castings,	pounds	815,754	3,745,942
Iron blooms, bar and sheet,	do.	1,742,826	24,619,126
Lead in pigs and bars,	do.	72,214	443,507
Copper and tin,	do.	79,419	787,233
Marble,	do.	330,958	592,550
Lime,	bushels		2,437
Limestone,	perches		209
Bricks,	number	153,215	111,730
Timber,	feet	123,527	35,756
Sawed lumber,	do.	9,822	307,865
Staves, heading and hoop poles,	pounds	182,068	4,000

TABLE No. 2—Continued.

ARTICLES.		Philadelphia.	Intermediate offices.
Shingles,	number		103,500
Posts and rails,	do.	1,000	1,282
Sundries,	pounds	2,730,507	19,728,369
No. of boats and cars cleared,		14,356	21,744
Passengers, miles travelled,		2,078,089	4,498,080

TABLE No. 3.

Exhibiting a statement of property shipped Eastward from Pittsburg and intermediate offices.

ARTICLES.		Pittsburg.	Intermediate Offices.
Flour,	barrels	45,587	106,326
Wheat,	bushels	1,427,247	170,852
Corn and other grain,	do	328,892	413,735
Clover and other grass seeds,	do	80,667	17,619
Potatoes,	do		6,936
Salted beef,	barrels	183	289
do pork,	do	1,343	1,116
Bacon,	pounds	3,667,180	122,744
Fish,	barrels	44	15,084
Butter and cheese,	pounds	90,159	941,877
Lard and tallow,	do	273,750	158,303
Salt,	bushels		72,060
Provisions not specified,	pounds	29,747	2,327,748
Feathers,	do	67,308	955
Wool,	do	867,790	71,601
Cotton,	do	209,566	645,954
Hemp,	do	107	91,037
Tobacco,	do	4,336,372	500,727
Leather,	do	4,450	871,435
Raw hides,	do		2,150
Furs and peltry,	do	110,364	20,372
Whiskey and domestic spirits,	gallons	424,299	417,897
Merchandise,	pounds	495,977	644,754
Groceries,	do	158,540	70,296
Oil,	gallons	26,311	2,721
Drugs and dye-stuffs,	pounds	60,294	10,189
Gypsum,	tons	547	44,809
Furniture,	pounds	51,337	278,955
Window glass,	boxes	5,589	28
Rags,	pounds	114,881	66,280
Mineral coal,	tons	2,656	21,495
Iron ore,	do		6,493

TABLE No. 3—Continued.

ARTICLES.		Pittsburg.	Intermediate Offices.
do pigs and castings,	pounds	337,683	7,046,311
do blooms, bar and sheet,	do	176,557	5,355,651
Lead in pigs and bars,	do	4,581	20,645
Copper and tin,	do	248	24,091
Marble,	do		1,195,743
Lime,	bushels		9,124
Limestone,	perches		1,055
Bricks,	number		25,150
Timber,	feet		192,623
Sawed lumber,	do	5,950	11,411,353
Staves, heading and hoop poles,	pounds		1,140,368
Shingles,	number	3,300	2,536,193
Posts and rails,	do		71,367
Sundries,	pounds	1,062,259	3,838,945
No. of boats and cars cleared,		2,466	43,986
Passengers, miles travelled,		2,907,124	1,353,354

TABLE NO. 4,

Exhibiting a statement of property shipped Southward, from the different offices not on the main line of canal and railway.

ARTICLES.	TOTAL FROM OFFICES.	
Flour,	77,455	barrels
Wheat,	102,052	do
Corn and other grain,	88,885	do
Clover and other grass seeds,	2,929	do
Potatoes,	1,240	do
Salted beef,	138	do
do pork,	25,882	do
Butter and cheese,	266,767	pounds
Lard and tallow,	39,527	do
Salt,	918	bushels
Provisions not specified,	142,833	pounds
Wool,	282	do
Tobacco,	10,940	do
Leather,	380,396	do
Raw hides,	1,104	do
Whiskey and domestic spirits,	426,811	gallons
Merchandise,	34,901	pounds
Oil,	36,929	gallons
Drugs and dye-stuffs,	1000	pounds
Gypsum,	35,394	tons
Furniture,	200,794	pounds
Rags,	54,825	do

TABLE No. 4—Continued.

ARTICLES.	TOTALS FROM OFFICES.
Mineral coal,	113,647 tons
Iron pigs and castings,	1,769,457 pounds
do blooms, bar and sheet,	1,256.814 do
Lead in pigs and bars,	1,682 do
Copper and tin,	950 do
Marble,	1,193 do
Lime,	85,804 bushels
Limestone,	2,068 perches
Bricks,	7,139 number
Timber,	169,653 feet
Sawed lumber,	2,319,690 do
Staves, heading and hoop poles,	740,553 pounds
Shilgles,	185,210 number
Post and rails,	714 do
Sundries,	14,789,932 pounds
No. of boats and cars cleared,	5,102
Passengers, miles travel,	458,195

TABLE No. 5.

Exhibiting a statement of property shipped Northward, from the different offices, not on the main line of canal and rail way.

ARTICLES.	TOTAL FROM OFFICES.
Flour,	55 barrels
Wheat,	302 do.
Corn and other grain,	1,140 do.
Salted pork,	6 do..
Bacon,	30,632 pounds
Fish,	320 barrels
Butter and cheese,	100 pounds.
Salt,	15,328 barrels
Provisions not specified,	23,143 pounds.
Tobacco,	1,880 do.
Leather,	5,823 do.
Raw hides,	44,008 do..
Furs and peltry,	3,505 do.
Whiskey and domestic spirits,	3,380 gallons
Merchandise,	1,154,183 pounds
Groceries,	803,768 do.
Oil,	50,569 gallons
Drugs and dye stuffs,	8,769 pounds
Gypsum,	742 tons
Furniture,	179,846 pounds
Window glass,	14,265 boxes
Mineral coal,	1,703 tons

TABLE No. 5—Continued.

ARTICLES.	TOTALS FROM OFFICES.
Iron ore,	874 do.
Iron pigs and castings,	1,311,641 pounds
Iron blooms, bar and sheet,	1,132,782 do.
Lead in pigs and bars,	2,250 do.
Marble,	8,060 do.
Lime,	5,728 bushels
Limestone,	239 perches
Bricks,	11,800 number
Timber,	21,056 feet
Sawed lumber,	151,787 do.
Shingles,	74,640 number
Posts and rails,	7,200 do.
Sundries,	2,724,318 pounds
No. of boats and cars cleared,	461
Passengers, miles travelled,	15,389

LIST OF DOCUMENTS

ACCOMPANING THE REPORT OF

THE CANAL COMMISSIONERS.

PHILADELPHIA AND COLUMBIA RAIL ROAD.

- No. 1. H. R. 14. Report of A. Mehaffy, superintendent transportation and motive power, Western division.
2. 15. Report of William Russell, supervisor and superintendent Western division, accompanied with a statement No. 1.
- 3 16. Report of F. Vogel, superintendent Eastern Division, accompanied with statements marked A and B.
4. 17. Report of John P. Bailey, engineer and estimate of the expense of avoiding inclined plane at Columbia and accompanying document marked A.

GETTYSBURG EXTENSION, PENNSYLVANIA RAIL-WAY.

5. 18. Report and estimate of John P. Bailey, principal engineer.
6. 19. Report of Samuel Fahnestock, superintendent.

PORTAGE RAIL-WAY.

7. 20. Report of Mark Graham, superintendent, accompanied with statements marked A and B.
- No. 8. H. R. 21. Report of John S. Weistling, superintendent motive power and transportation.

WESTERN, BEAVER AND FRENCH CREEK DIVISIONS.

9. 22. Report of Charles T. Whippo, principal engineer upon Beaver division.
10. 23. Report and estimate of Charles T. Whippo, principal engineer, Western and French Creek.

SUSQUEHANNA, NORTH AND WEST BRANCH DIVISION.

- 11. 24. Report of James D. Harris, principal engineer, Erie extension.
- 12. 25. Report and estimate of Charles T. Whippo, principal engineer Shenango line.
- 13. 26. Report of John Reynolds, superintendent with accompanying schedules, marked from 1, 2, 3, 4, 5, 6, 7, 8 and 9.
- 14. 27. Report of Charles T. Whippo, principal engineer upon the routes from Conneaut lake to the harbor of Erie, with accompanying estimates of the Eastern and Western routes.

TANGASCOOTACK EXTENSION.

- 15. 28. Report of James D. Harris, principal engineer and estimate.
- 16. 29. Report of A. B. Reed, superintendent, accompanied with tabular statements A and B.

NORTH BRANCH EXTENSION.

- 17. 30. Report of James D. Harris, principal engineer accompanied with estimates marked A.
- 18. 31. Report of James D. Harris, Tioga line with accompanying estimate.
- 19. 32. Report of William Keeler, superintendent.
- 20. 33. Journal of the Board of Canal Commissioners.

PHILADELPHIA AND COLUMBIA RAIL ROAD.

No. 1.

Report of A. Mehaffy, Superintendent of transportation and motive power, Western division.

To the Hon. the Board of Canal Commissioners.

The undersigned respectfully submits the following Report of operations in the "Motive Power" department on the Western division of the Columbia and Philadelphia rail-road, during the period between the first day of March and the 31st of October, of the present year.

Though this report will not embrace the time previous to the first of March, because on that day the undersigned first took charge of the division, yet it may not be improper briefly to state the condition of things on the road at that time.

When he proceeded to the division, he found the road nearly wholly blocked up with snow and ice—the men unpaid, and exceedingly dissatisfied with the State service—the engines, with four or five exceptions, out of order—the repairing shops nearly deserted and destitute of proper tools and conveniences, and the road itself in a miserable state of repair. If to this be added the low state of the commonwealth's credit, caused by the continuance and accumulation of debt on the road, and the want of confidence of transporters and others, in its management and direction, an amount of obstacle to reform and improvement will be apparent, to overcome which required the utmost exertion of patience, energy and methodical effort.

The subscriber cannot flatter himself that he has been entirely successful in removing all the difficulties which were in his way, but he does feel assured, that when their magnitude is fully known, credit will rather be given for what has been accomplished, under such disadvantageous circumstances, than censure be inflicted for unavoidable short comings.

When the charge of the division was committed to the undersigned, he, in common with many others, felt great doubt on the question, whether so complicated a machine as a rail-road, the motive power of which was owned by the State, could be so managed as to give satisfaction to the public, and be profitable to the commonwealth. But he now has no hesitation in stating, from actual experience, that it can.—From the measures adopted during the summer to simplify and render efficient the system of control and accountability on the road, and from the reformatations recently made, which were justified and rendered obvious by the experience of the season, and from the public

confidence already expressed in their result, there can be little doubt of entire success. It is of course out of the question to attempt to satisfy all, but no doubt is now entertained of being able so to manage the motive power department, as to give satisfaction to *reasonable* men, and to make the motive power fund, with the arrangements which will hereafter be suggested, pay all claims upon it.

One of the most frequently urged, and, if true, the most serious objections to the management of the road, is that of the intemperance of engineers and others, and of unnecessarily frequent stoppages of passenger trains. With regard to the former, it must be remembered, that during a great portion of the past season, locomotive engineers were procured with much difficulty—great demand existed for their services—hence such strict discipline could not be enforced as was desirable, without the risk of setting some of the engines idle. Though this fact is stated as an excuse for such irregularities as may actually have existed, yet the subscriber must say that, as far as his observation extended, instances of intoxication were astonishingly *rare*, and that many of the persons who brought charges of this kind, were themselves the last to leave the tavern bar, and take their seats in the cars. Hereafter the utmost exertion will be made to avoid even the appearance of this dangerous irregularity.

It is now distinctly understood, in every department of the State service along the road, that the first instance of intoxication will cause *immediate* dismissal. This rule will be rigidly attended to.

As to the frequency of halts on the road, it must be remembered, that the through passengers were not alone to be attended to; the way passengers had equal claims to accommodation; hence the necessity of establishing nearly twenty stopping places on the line. Next season this objection will, most probably, be obviated, by the starting of two trains every morning from each end of the road, one for the through passengers, which will not halt except to take in fuel and water, and the other for way passengers, which will stop at any desired point. It may be proper here to remark, for the information of those interested, that valuable improvements have been made during the season in the construction of the passenger cars now in use on the road. These cars are more peculiarly fitted to secure the passengers from all risk of injury than those formerly used. Their great size and weight render it almost impracticable to throw them off the track; and the fact of their having four wheels and two axles to support each end of the car, will prevent any injury to the passengers by the breaking of one wheel, or one axle. The improvements making in the cars, almost daily, certainly reflect much credit on the proprietors. One in which the travelling public have the deepest interest, will be fully adopted the next spring. Instead of axles of rolled iron, made in one solid mass, and extremely liable to break, others, formed of three quarter inch wrought iron bars, welded together in such numbers as to give the necessary strength, and yet retaining the effect of the separate soundness of each, will be in general use. Great care is also now taken in the selection and construction of wheels. The

carrying of passengers has become a very important branch of the business of transportation.—Before the opening of this rail-way, two coaches were sufficient to convey all the passengers between Philadelphia and Columbia.—If we assume these coaches at an average to have taken ten persons at each trip, it will follow that the number now passing between those two places, (which is estimated at five hundred daily,) would require fifty coaches, and not less than eighteen hundred horses, on a common road, to accommodate this branch. So far as regards passengers and light goods, which require despatch, it is obvious that the rail-road, as compared with the canal, has an advantage which cannot be attained by the latter. The great speed and cheapness of transit attainable upon a rail-road by steam power, will always secure it a monopoly of the travelling.

Though the passenger department is that in which the greatest number of citizens are directly interested, and to which an account of the number of lives risked, the officers of the road are bound to pay the first and most strict attention. Yet, the transportation of goods and produce is the chief source of revenue to the state. Present appearances, present the cheering prospect of a vast increase in this branch of the business of the road during the coming season. There have been, during the year just closed, three companies upon the road, each having fifty cars or thereabouts, in addition to those owned by other smaller companies and by individuals.

It is said that each of the larger companies have made arrangements to double their number of cars by next spring, and that two new companies of at least equal strength will then also place lines upon the road. Notwithstanding this vast anticipated increase of business, it is believed that there will be not only an abundance of power on the road for its accommodation, but enough to authorize the superintendent to devote at least two engines for the exclusive transportation of the way trade.

Among the recent measures of reform introduced upon the road, and bearing equally upon each division of it, which is calculated to produce the greatest benefit to the state, and the transporting public, may be specified as the most efficient, that of committing the charge of the motive power and its fund on the whole road to one officer. The subscriber feels that this trust might easily have been committed to abler hands than his own. He also wishes to avoid even the appearance of imputation on his former respectable associate. But he must say, that a station requiring such promptness of decision, unity of system and perfect subordination of agents, can never be safely or profitably filled by two persons, holding equal and consequently clashing jurisdiction, when the length of the road, the shortness of its curves, the presence of two inclined planes, the connection of steam and horse power, the difficulty of accommodating simultaneously passenger and burthen cars, the importance of the way trade, the immense amount of thorough business, and the great variety of interests to be accommodated are considered, the necessity of giving the utmost possible efficiency, unity and energy to its management, becomes ap-

parent. The subscriber duly appreciates the responsibility which has been cast upon him, but he hopes, with the assistance of the board, to be able to sustain it.

While making these general remarks relative to the whole road, he would respectfully call the attention of the board to the expediency, nay, the absolute necessity and ultimate profit of dispensing with both the inclined planes, as soon as practicable. Statement No. 1, exhibits the annual expense to the commonwealth of maintaining the Columbia inclined plane, as near as it can be ascertained. That at Philadelphia is equally an impediment, and, taking into account the expense of horse power from its foot to Broad street, the whole of which would be saved, if the plane were avoided, its annual expense may be set down as twice as much. But apart from all considerations of saving to the state, the loss in time to the travelling and transporting public, and the decreased power and efficiency of the road itself, present reasons for the speedy avoidance of both planes which are unanswerable. These remarks are the more proper, as it has been ascertained that both may be avoided at a trifling expense to the state. The outlay will not only be comparatively small, but in the end prove an actual saving, because the present annual cost of keeping up the planes, will pay at least double the interest of the sum necessary to get rid of these *nuisances*. In the mean time however, it will be absolutely necessary to make provision for new ropes for both planes, to meet the spring business, an appropriation for this purpose of not less than seven thousand dollars is respectfully recommended. This will also cover the cost of the necessary attaching ropes.

Another means of promoting the prosperity and usefulness of the road, will be the future purchase and use of none but the very best locomotives. Owing to the infancy of the business of engine building, and the deficiency of power last spring, some were necessarily purchased, which have been a constant source of vexation, delay and expense. The running of these, must ever be an actual loss to the state. Hereafter, none will be kept on the road, except such as can do full work, all others will be disposed of as soon as possible, consistently with the interests of the state, under the resolution of the board to that effect. Statement No. 2, will exhibit the names, builders and performance of the twenty-seven engines which were on the road during the season. Two of them, viz: the "Fire Fly" and "Red Rover," both British engines, have recently been sold, and it would have been a saving to the commonwealth had they been given away for nothing the first day they were placed on the track.

As an additional means of giving certainty and regularity to the passenger department of transportation, state agents will, with the approbation of the board, be placed on each passenger train, their duty will be to see that a fair return is made of the number of passengers carried by each car—to regulate the speed of the engine, and time and place of stop, and to have such other general supervision over the train, as may promote the safety and comfort of the passengers, and the interest of the public; and especially to see that the agent of

each car is constantly at his brake, so as to effect an instant stop of the whole train in case of accident. This course is recommended, as well from the evident necessity and propriety of the measure, as in conformity with a recommendation to that effect by the committee of the House of Representatives, which examined the state of the road last winter.

As a measure of prudent economy, it has been found proper to decrease the number of firemen. Heretofore on this road there were two firemen on each locomotive; now there is but one with a slight increase of salary. This change will amount, when the road is in full operation, to a saving of about ten dollars per day. The subject of repairing engines, is one of vital importance to the prosperity of the road; the original design evidently contemplated, that this should be performed at one large and central establishment. Accordingly under the former officers, Parkesburg, situated nearly midway of the road was selected, and expensive though incomplete buildings were erected for the purpose. During the last session of the legislature, a further appropriation of twelve thousand dollars, to complete them, was made and has been expended, part in payment of old debt, and the balance towards completing the establishment.

The buildings and accommodations are still insufficient; it will be necessary to enlarge them, so as to contain the increased number of locomotives, which the advancing business of the road will render necessary next season. For this purpose, an appropriation of three thousand dollars will be necessary. A further appropriation of five thousand dollars will be required, for the purchase of turning lathes, and other machinery, which is already engaged, and will be indispensable for the spring business.

These appropriations will complete the establishment, and they are asked for with the utmost confidence of the propriety of centering all the repairs at Parkesburg. The reasons for doing so, are almost too obvious to need a statement. But lest objection might be urged, it may be proper to enumerate some of them. The most prominent is to be found in the current of public opinion against the continuance of the inclined planes, and consequently in the folly of expending more money at the head of either, for repair purposes, these being points which will probably be abandoned in a year or two. But further, even though the inclined planes, were to be continued, they are the most improper points for work shops.

Their vicinity to the city of Philadelphia, and to Columbia, have the unavoidable tendency of unsettling the hands: and rendering them irregular in the performance of their duties. This evil cannot exist in any great degree at such a small remote place as Parkesburg.

Another in favor of the latter place is, that the locomotive engineers, except of such as need repairs, will not be present over night, to impede the progress of the work, or draw off the hands; when to this is added the fact, that the adoption of one central establishment, will bring the whole subject of repairs under the eye and management of one principal machinist, who will reside on the spot, and be responsi-

ble for the good management of the whole concern. The reasons for the arrangement, are so strong, as to require no further remark. While speaking of the repair of locomotives; it is truly gratifying, to be able to state, that the discontinuance of high speed, and the adoption of regular and low running (15 miles per hour,) which were effected about the middle of last October, have already produced a most beneficial effect, not only have the confidence and safety of passengers been increased, but a most perceptible diminution of the cost of repairs has taken place. In addition to this, a saving in the item of repairs, and loss of goods for the owners of cars, and the state, in the repair of the road.

After these general remarks relating both to the former and present condition of the whole road, and to the measures adopted and recommended for the further improvement of its use. The subscriber will now proceed to give specific information of the operations on the Western division. As will be seen by the report of the proper disbursing officer of the division, the whole amount of toll received for motive power on this division from the 1st of March till the first of November 1836, was \$40,736 94, and that the sum expended for purposes chargeable to the motive power fund, and the debts contracted for the use of motive power, together amount to \$55,429 05, leaving a deficiency of means, in the fund to meet the demands against it, for the same period of \$14,692 11. If from this latter sum, be deducted the excess of the stock of coal, iron, wood, oil, &c, now on hand, beyond that on hand on the first day of March; viz: \$1750, the actual amount of deficiency will be \$12,942 11. Instead of this trifling deficiency, an actual excess of receipts over expenditures would have taken place, had it not been for causes beyond the power of the public agents, at the time, to obviate.

When the present officers took charge of the road, out of eighteen locomotives owned by the state, only five were in tolerable order. The rest were wholly out of repair, and to be put in instant running order, to accommodate the immense accumulation of merchandise, which took place in the warehouses during the winter, under great disadvantages, and at an extraordinary expense. The state workshops, were nearly destitute of workmen and tools, consequently many of the repairs were obliged to be made in the city of Philadelphia, at a greatly increased expense and loss of time, since that time however, the shops of the state, have been to a great extent, furnished with tools, and conveniences for repairing, which was paid out of the motive power fund. This item of expense which accounts for a considerable portion of the present deficiency; will of course not be so heavy hereafter. Another cause of the deficiency, is to be found in the want of sufficient power on the road, during the former part of the season. The few locomotives on it, were necessarily run at high speeds, and more frequently during the day, than was consistent with keeping them in a proper state of repair; their wear and tear, and cost of repairs were consequently much increased. If to this be added, the inferior quality of many of the engines, the earnings of which

did not actually keep them in order, to say nothing of paying their other expenses; the surprise will be, not that there is a *deficiency*, but that it is *so small*.

On the first of March, the debt due by the motive power fund, was about fifty-two thousand dollars on the whole road, as will appear by the accounts of the disbursing officers.

Statement No. 3 exhibits the names, duties, time of service, pay of all the officers, and others employed and paid on the Western division during the time covered by this report. Those marked with a star are now out of the service.

In this list are not included locomotive engineers and firemen, as those persons were employed and paid by the officers of the Eastern division, to whom the board is respectfully referred for detail.

In conclusion, it is gratifying to the Superintendent to have it in his power to state that there is at present ample motive power on the road to meet the current demands of the trade, and that there will be a sufficient number of locomotives upon it in the spring to accommodate the anticipated increased business. Measures have already been taken to put all the engines owned by the State in complete repair during the winter.

The whole number (as has been previously stated) is twenty-five. In addition to these, twenty have been recently contracted for, thirteen with M. W. Baldwin, four with Wm. Norris, and three with Garrett & Eastwick, all of Philadelphia. These engines will be of more than ordinary capacity, and adapted to the use of mineral coal, (agreeably to the act authorizing their purchase.) To pay for them an appropriation of one hundred and-forty nine thousand five hundred dollars will be required. They are to be paid for immediately after actual trial on the road, and approval by the Engineer of the line, or Superintendent of motive power.

One other subject of deliberation it is proper to submit to the board. The increase which has taken place in the price of all the necessary articles of consumption connected with the motive power department, has caused and will continue to cause a deficiency of the fund to sustain itself. Wood has increased in price on the whole line about one dollar per cord, coal from four dollars and fifty cents to eight dollars per ton, at the eastern end of the road, and at the west from three dollars twenty-five to five dollars. Iron, from ninety to one hundred and twenty dollars per ton. Oil, from ninety cents to one dollar per gallon.—Scarcely an article can be named, which has not experienced a proportional advance. Labor has slightly advanced, and if the prices of food and other necessary articles continue as they are, must, in justice, be further remunerated.

These facts are submitted with the view of calling the attention of the board to the question, whether the state should not receive something nearer an equivalent for the use of the road, and of the power upon it, than is now paid. It is not presumed to be the policy of the commonwealth to make the road a source of pecuniary profit, but it

certainly does seem most reasonable, that it should be made maintain itself.

The whole amount of appropriation recommended in this report, will appear by referring to statement No. 4.

All which is respectfully submitted,

A. MEHAFFEY,

*Superintendent Motive Power, on Western district
Columbia and Philadelphia Rail-Road.*

RAIL-ROAD OFFICE, Columbia, Nov. 1st. 1836.

No. 1.

Annual expense of maintaining the Columbia Plane, as follows :

One rope.	\$3,000 00
Services of one engineer,	730 00
Do. one fireman,	365 00
Do. four signal men,	1,460 00
Do. one rigger,	456 00
Do. one watchman,	365 00
547 tons of coal,	2,835 00
Attaching ropes,	500 00
Oil, and necessary repairs to engine,	500 00
Horse power,	5000 00
Incidental expenses,	279 00
To which should be added loss in motive power consequent to the necessary detention at the plane,	2,000 00
	<hr/>
	\$ 17,490 00
	<hr/>

No. 2.

Commenced running.	From whom purchased.	Names.	No. miles traveled.	No of trips.	No of cars drawn.	Average per trip.
1835						
May 18	M. W. Baldwin,	Schuylkill,	15,554	202	2,063	$10\frac{1}{2}$
"	Do	Delaware,	14,091	183	1,813	10
"	Do	Susquehanna,	10,241	133	1,424	$10\frac{1}{4}$
"	Do	Ohio,	16,016	208	2,294	11
"	Do	Columbia,	6,015	78	701	9
"	Do	Pennsylvania,	12,739	166	1,883	$11\frac{1}{2}$
"	Do	Philadelphia,	11,778	153	1,719	$11\frac{1}{2}$
"	Do	Lancaster,	5,873	69	713	$10\frac{1}{2}$
July 23	Do	Kentucky,	13,857	141	1,312	$9\frac{1}{3}$
Sept. 7	Do	Junata,	14,229	177	1,955	11
Oct. 22	Do	Brandywine,	11,739	137	1,410	$10\frac{1}{4}$
" 14	Long & Norris,	W'm Penn,	7,854	102	676	$6\frac{1}{2}$
1836						
July 13	W'm Norris,	George Washington,	6,467	84	1,008	12
May 12	Do	Robert Morris,	10,583	129	1,249	$9\frac{2}{3}$
Aug. 19	Do	Benjamin Franklin,	6,930	90	726	8
Oct. 19	Do	W. C. Farmer,	154	2	36	18
Sept. 1	C. Sellers & Son,	America,	3,459	47	397	$8\frac{1}{2}$
" 1	Do	Sampson,	3,234	42	472	$11\frac{1}{4}$

Commencing.	From whom purchased.	Names.	No miles travelled.	No. of trips.	No. of cars drawn.	Average per trip.
1835 July 7	A. & G. Ralston, Do	Albion,	6,966	95	591	6 $\frac{1}{4}$
June 18	Do	Atlantic,	4,158	54	371	7
May 18	Do	John Bull,	385	5	34	7
July 24	Do	Fire Fly,	3,542	46	166	3 $\frac{1}{2}$
" 27	Do	Red Rover,	3,234	42	171	4
1836	Young	Planet,	3,773	49	448	9 $\frac{1}{4}$
May 28	Do	Columbus,	1,540	20	225	11 $\frac{1}{4}$
July 22	Do	Comet,	1,848	24	204	8 $\frac{1}{2}$
" 16	Do	Backwoodsman,	1,155	15	182	12
Oct. 9	M'Clurg, W. & Co.					

Names of Agents.	Duties.	Time of service	Daily pay.	Amount paid each.
John Brandt,	Master machi-	214 days	\$3 00	\$642 00
J. W. Hunter,	nist			
	Foreman at	24 do	1 87 $\frac{1}{2}$	45 00
Do.	Parkesburg	131 do	2 00	262 00
Do.	do.	52 do	2 50	130 00
Isaac Reifsnyder,	Foreman at	183 do	1 83 $\frac{1}{3}$	335 48
George Gregory,	Columbia sta.			
Do.	Smith	158 do	2 00	316 00
Phelps Mix,	do.	52 do	2 33 $\frac{1}{3}$	121 32
Do.	Machinist	75 do	1 87 $\frac{1}{2}$	140 62 $\frac{1}{2}$
John Watts,	do.	104 do	2 00	208 00
Do.	do.	113 do	1 75	197 75
Do.	do.	27 do	1 87 $\frac{1}{2}$	50 62
Thomas Hoxworth,	do.	50 do	2 00	100 00
David Ralston,	do.	201 $\frac{1}{2}$ do	1 16 $\frac{2}{3}$	234 73
Do.	do.	144 $\frac{1}{2}$ do	1 16 $\frac{1}{2}$	169 33
Lewis Glasby,	do.	49 do	1 37 $\frac{1}{2}$	67 37 $\frac{1}{2}$
Do.	do.	26 do	1 16 $\frac{2}{3}$	30 33
Do.	do.	35 do	1 00	35 00
Do.	do.	102 do	1 35	137 70
John Philips,	do.	162 do	1 50	243 00
Joseph Gregory,	do.	89 do	1 16	103 66
Do.	do.	52 do	1 50	78 00
Henry Kamerer,	do.	67 do	1 33 $\frac{2}{3}$	89 32
Do.	do.	125 do	1 50	187 50
Joseph Hughes,	do.	155 do	1 75	271 25
Do.	do.	24 $\frac{1}{2}$ do	2 00	49 00
*Henry Sheaff,	do.	27 do	1 75	47 25
George Hoxworth,	do.	98 $\frac{1}{2}$ do	1 50	147 75
Do.	do.	102 do	1 75	178 50
Hiram Baldwin,	Carpenter	79 $\frac{1}{2}$ do	1 33	105 98
Do.	do.	46 do	1 50	69 00
James Quinn,	Machinist	55 do	1 00	55 00
Abraham Steffy,	do.	46 do	83 $\frac{1}{3}$	38 29
*Joseph Swithenbank,	do.	74 do	2 00	148 00
*Thomas Stainbrook,	do.	14 do	1 75	24 50
*W. C. Bonsall,	do.	15 $\frac{1}{2}$ do	1 50	23 25
*James Docherty,	do.	24 do	1 00	24 00
George Rakestraw,	Car inspector	229 do	2 50	572 50
James Armstrong,	Machinist	75 do	1 16	87 00
*Charles Lay,	do.	101 do	1 50	151 50
Isaac P. Lewis,	do.	66 do	1 50	99 00
*Lewis Tripp,	do.	42 $\frac{1}{2}$ do	1 87 $\frac{1}{2}$	79 68 $\frac{1}{2}$
*Charles Achy,	Carpenter	36 do	1 66 $\frac{2}{3}$	60 00

No. 3—Continued.

Names of Agents.	Duties.	Time of service	Daily pay.	Amount paid each.
David Bentley,	Machinist	88½ days	\$1 00	\$88 50
James Hardman,	do	102 do	2 00	204 00
John Oliver,	do	28¼ do	1 00	28 25
Do.	do	128 do	1 16 ² / ₃	148 64
Samuel Hardman,	do	60 do	1 66 ² / ₃	99 89
*Elisha Hammel,	do	39 do	1 00	39 00
*William Carabine,	do	4 do	1 75	7 00
*Warren M'Curdy,	do	52 do	1 75	91 00
Benjamin Franck,	do	90 do	1 16 ² / ₃	104 45
*H. A. Montgomery,	do	90 do	1 25	112 50
Jeremiah Wonder,	do	75 do	1 00	75 00
Seymour Bennett,	do	47 do	1 66 ² / ₃	78 34
Do.	do	46 do	1 83 ¹ / ₂	84 32
*George Carear,	do	69 do	1 12 ¹ / ₂	69 87½
Thomas King,	do	92 do	1 50	138 00
*Ferdinand Lechler,	do	112½ do	1 62½	182 80½
Rudolph Graff,	do	99 do	1 16 ² / ₃	114 04
Do.	do	51 do	1 33 ² / ₃	67 91
Daniel Stape,	Smith	44 do	1 50	66 00
Michael Bannon,	Machinist	99 do	2 00	198 00
Do.	do	21 do	1 87½	39 37½
William Stewart,	do	54 do	1 33	33 25
*Edward D. Rice,	do	25 do	1 75	43 75
Thomas Walker,	do	20 do	2 00	40 00
George A. Milliner,	do	12 do	1 87½	22 50
Do.	do	75 do	2 00	150 00
*William Taylor,	do	38 do	2 00	76 00
Henry Wolf,	Smith	121 do	1 50	181 50
*Levi Moore,	Watchman	161½ do	1 00	161 50
*William Scott,	Machinist	21 do	2 00	42 00
*Alexander Harvey,	do	42 do	2 00	84 00
*John Taylor,	do	38 do	1 83½	69 62
John Lenher,	do	83 do	2 00	166 00
*David Orr,	do	15 do	1 50	22 50
Patrick Smith,	do	15½ do	1 50	23 25
Wm. P. Beatty, jr. }	Manager at plane	209 do	1 50	313 50
Thomas Barber, }	Stationary engine	214 do	2 00	428 00
Isaac Mason,	Fireman	214 do	1 00	214 00
William Wilson,	Watchman	167 do	1 00	167 00
John Jenks,	Rigger	214 do	1 25	260 75
Henry Cassel,	Signal man	214 do	1 00	214 00
Thomas B. Odell,	do	178 do	1 00	178 00
Jesse M. Kneer,	do	189 do	1 00	189 00

No. 3—Continued.

Names of Agents.	Duties.	Time of service	Daily pay.	Amount paid each.
Hugh Pedan,	Signal man	142 days	\$1 00	\$142 00
John Buchanan,	Car agent	10 do	1 00	19 00
Do.	do	99 do	1 12½	111 37½
Enos Mills,	Signal man	31 do	1 00	31 00
Gerhart Brant,	Waterman	77 do	75 & \$1	61 00
Do.	do	90 do	1 00	90 00
Martin Smith,	do	149 do	1 00	149 00
Do.	do	77 do	75 & 1	61 00
George Miller,	Woodsawyer	292½ do	75 & 1	176 50
George Smith,	do	179 do	75 & 1	156 25
Jacob Anx,	do	51 do	75	38 25
Do.	do	131 do	1 00	131 00
Jacob Wagner,	do	199¾ do	75 & 1	185 06
Casper Yeager,	do	155 do	75 & 1	142 25
Henry Deitz,	do	156 do	75 & 1	173 25
Michael Seiffly,	do	156 do	75 & 1	143 25
John King,	Waterman	214 do	87½	187 25
Do.	do	86 nights	62½	53 75
John Roth,	do	214 days	87½	187 25
Do.	do	86 nights	62½	53 75
James B. Lytle,	do	214 days	87½	187 25
Do.	do	76 nights	62½	47 50
Do.	do	26 do	1 00	26 00
Nathaniel Trout,	do	214 days	87½	187 25
Do.	do	103 nights	62½	67 12
Thomas Ross,	do	153 days	1 00	153 00
Do.	do	168 nights	62½	105 00
*John Beck,	do	31 days	1 00	31 00
*Sam l. Michner,	do	31 do	1 00	31 00
*William Donis,	do	31 do	1 00	31 00
*Joseph White,	do	31 do	1 00	31 00
*John Smith,	do	11 do	75	8 25

No. 4.

Estimated amount required for the ensuing year.

Additional set of ropes at inclined planes,	\$ 7,000 00
For the enlargement of Parksburg shop,	3,000 00
Tools, machinery, &c. for same,	5,000 00
Twenty additional locomotives and tenders,	149,500 00
	<u>\$ 164,500 00</u>

No. 2

Report of William Russell, Supervisor and Superintendent Western division.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN—As Supervisor of repairs on the Western division of the Columbia and Philadelphia rail road, I have the honor to submit the following report, which, though I was not appointed till the thirteenth of July last, will embrace all transactions on the division as far back as the first day of the preceding March, when my respectable predecessor, Jos. W. Patton, Esq., took charge of the road. The division, when committed to Mr. Patton, was in a wretched state, the excavations were generally blocked up with snow, the removal of which cost a large sum, and when this impediment was overcome, many and expensive repairs were found to be necessary: the effect of the preceding unusually hard winter was such, that most of the stone blocks and wooden cross-ties, were sunk or otherwise displaced. This was the cause to so great an extent that the trains in passing along were frequently off the track. From this cause a general and thorough examination and repair of the whole division became necessary, and was executed, at an expense much beyond which will ever be required hereafter. While these repairs were going on, the long spell of rain which fell about the middle of June last, occurred. The effect upon some parts of the road was extremely severe; the Gap section suffered much; that portion of the road passes through a peculiar kind of soil, composed of quicksand, which became completely saturated with water, and slid from each side down upon the road, to the depth of several feet. This untoward circumstance completely closed that part of the road for several days. From the nature of the soil the obstruction was exceedingly difficult of removal; as fast as one portion of it was cleared off, another flowed in and rendered useless what was done before. At length, after great labor and expense, the road was cleared, and has remained so during the remainder of the season. This section is still in an unsafe and precarious condition, but arrangements are about being made, with the concurrence of the chief engineer of the road, for its permanent improvement. The same rains carried away a culvert, through which a branch of the Octoraro creek passes, at the eastern foot of the Gap grade. With strange want of foresight, a mere culvert of ten feet had been built to pass the waters of this creek, which is very subject to high and sudden freshets. With the culvert was swept off a large portion of the adjoining embarkment. The breach was promptly and temporarily repaired by my predecessor, so that in two days the trains passed over as usual. Instead of the former insufficient culvert; a bridge, consisting of stone abutments, and a wooden superstructure, fourteen feet wide, has since been erected. This has placed that por-

tion of the road out of all reach of a similar occurrence, though it has materially increased the amount of repairs. As a general remark it may be stated, that nearly all the culverts and water passages under the road are quite too small, and were generally very defectively constructed, and will be a continual source of expense. The paving, and a part of the wing walls of several had to be renewed, and the whole of them require the most watchful attention. The sliding in of the sides of the deep cut east of Parkesburg, has been a source of much expense; it occupied (nearly the whole of the season) ten additional hands, and two cars to remove the clay. It is to be hoped, that the sides of this excavation will soon, by the action of the weather, acquire a sufficient slope to obviate this difficulty. About the first of September it was found no longer possible to delay the repairs of the mill creek bridge. On letting off the dam, in which two of the piers stand, and removing a great depth of soft mud from around them, the original stone work was found to have been very much slighted; the stones had evidently been thrown promiscuously into a pile, and not built or placed in by hand. The inevitable result was the sinking of the foundations and the splitting of the piers. Buttresses placed on the solid rock have since been commenced around both, and are considerably advanced; the work being dry wall, can be prosecuted during the winter, and will effectually secure the bridge: The work heretofore done cost about eleven hundred dollars, and the further sum of four thousand nine hundred dollars will put the whole bridge (including certain indispensable repairs of the superstructure) into complete order. Upon examining the condition of the Little Conestoga bridge, it was found that the three western piers were dangerously split; small buttresses had formerly been erected at their corners, but had proved wholly ineffectual. The piers are about thirty feet in length, and require support the whole way up; on this account wide and substantial buttresses have been commenced, which, when completed, will afford the necessary support. The expense already incurred, is two thousand six hundred and eighty-four dollars and seventy-five cents, and the whole cost will be about five thousand dollars, of the two other large bridges on the division, that over the Big Conestoga is sound, and in perfect order, and the one over the Pequea does not require present repair. A road bridge in the city of Lancaster, owing to defective construction, fell down last summer; no steps have been taken as to rebuilding it, as it is doubtful whether the expense should be borne by the state or the city. I shall not take any measures on the subject, till I receive the instructions of the board.—These extraordinary drafts on the repair fund, will explain to the board the cause of the great expense of the road during the past season. It is hoped that they will be escaped for the future; no extraordinary repairs will be required during the coming season, unless something not now foreseen occur. The ordinary repairs, such as occasionally raising a block or a cross-tie, driving wedges, and keeping the side drains open, have been seasonably performed, and the division is now in good order. The whole amount drawn from the

Treasury since the first of March for repairs, is thirty four thousand seven hundred and twenty-five dollars and one cent and a half, of which there was applied to the payment of repair debt contracted previous to the first of March, seven thousand nine hundred and seventy-seven dollars and thirty one cents, and to the repair of the road since that time, twenty-six thousand seven hundred and forty-six dollars one cent and a half, leaving a balance in my hands of one dollar and sixty cents, as will be seen by reference to the proper vouchers in the Auditor General's Office. (For names of foremen, daily pay, &c., see statement No. 1.) It is supposed that thirty thousand dollars will, with a favorable season, be sufficient for the ordinary repairs of the road during the coming year. In my capacity, as superintendent of construction, and disbursing officer of the motive power fund, I beg leave further to report, that the various duties assigned me have been performed, as far as their nature would admit, and the subjoined statement will exhibit the sums received by me for the different objects therein specified; the amount of expenditure and of balance in my hands in each case respectively, and in the aggregate. It will be perceived, that on reference to the item of motive power in the statement, that there is a balance in my hands of one thousand two hundred and ninety three dollars and fifty-two cents. It must not be supposed from this, that there is an excess of funds over claims on the division to this extent. On the contrary, there are a number of outstanding claims due and unpaid to the amount of fourteen thousand six hundred and ninety-two dollars and eleven cents, which cause an actual deficiency of about twelve thousand nine hundred and forty-two dollars and eleven cents. For the causes of this deficiency, I would respectfully refer the board to the report of the superintendant of transportation on this division. The construction fund (except so much as went to pay old debt) was applied to the erection of dwelling houses for workmen, at Parkesburg; the balance on hand, it is supposed, will be sufficient to complete them. The fund for new work on old lines, was applied to the payment of old debt against that fund, and the expense of metal pipes to convey the water to Parkesburg. The balance, it is supposed, will be sufficient to pay the cost of laying the pipes, and of building a new water house and cistern, which are completed. These were found absolutely necessary, the former cistern and building having been too small to supply the engines.

Of the damage fund, the amount expended has been paid under a resolution of the former board.

The whole of the fund received for retained percentage, has been applied to that object, under resolutions of the board, and the account settled in the proper office.

The whole of the sum received for the purchase of ropes is yet unexpended, but will soon be needed.

The fund for paying engineers, superintendents, &c., has been applied accordingly, except the balance yet in hands.

For an account of the appropriations which will be necessary on this division, (except for repairs,) the board are respectfully referred to the

report of the superintendent of the transportation, who will hereafter have charge of the motive power fund.

I have the honor to be,

Your obedient servant,

W. RUSSELL.

*Supervisor of repairs and Superintendent Western division
Columbia and Philadelphia railway.*

STATEMENT No. 1.

The following exhibits the names of all the foremen of repairs, employed from first March, together with their daily pay, the number of days employed, and the whole amount paid to each, also the amount of the check roll of each, for every month between the first of March and thirty-first of October. The check rolls are in the Auditor General's office.

NAMES.	Daily pay.	No. of days.	Whole am't. of pay.	Amount of check roll.
<i>March.</i>				
Thomas Logan,	\$1 50	13	\$19 50	\$58 00
Frederick Hambright,	1 50	27	40 50	153 90 $\frac{1}{2}$
Emmor Reynolds,	1 50	13	19 50	38 75
Mahlon Mercer.	1 50	31	46 50	146 87 $\frac{1}{4}$
John O. Mickle,	1 50	13	19 50	55 40
John Enney,	1 50	31	46 50	111 25
Bernard O'Conner,	1 50	13	19 50	77 78 $\frac{1}{2}$
George Wike,	1 25	18	22 50	82 31 $\frac{1}{4}$
Jeremiah Whitson,	1 25	18	22 50	93 65 $\frac{3}{4}$
Frederick Dern,	1 25	4	5 00	34 75
James Blair,	1 25	18	22 50	78 27
James Devine,	1 25	24	30 00	131 28
George Mullen,	1 25	18	22 50	76 93 $\frac{3}{4}$
<i>April.</i>				
Alexander Rowan,	1 25	30	37 50	222 94 $\frac{1}{2}$
Mahlon H. Mercer,	1 50	3	4 50	13 00
Frederick Dern,	1 25	30	37 50	258 44 $\frac{1}{2}$
James Blair,	1 25	29	36 25	187 62 $\frac{1}{2}$
George Wike,	1 25	30	37 50	188 43 $\frac{1}{2}$
Jeremiah Whitson,	1 25	26	32 50	269 35 $\frac{1}{2}$
James Devine,	1 25	30	37 50	446 00
George Mullen,	1 25	30	37 50	224 00
Jonah Ogelsby,	1 25	27	33 75	374 38
<i>May.</i>				
Alexander Rowan,	1 25	31	38 75	251 65 $\frac{1}{4}$

STATEMENT No. 1—Continued.

NAMES.	Daily pay.	No. of days.	Whole am't. of pay.	Amount of check roll.
George Mullen,	\$1 25	31	\$38 75	\$231 68
Frederick Dern,	1 25	31	38 75	252 68 $\frac{3}{4}$
James Blair,	1 25	31	38 75	175 75
George Wike,	1 25	31	38 75	153 18 $\frac{3}{4}$
James Devine,	1 25	31	38 75	244 62
Jeremiah Whitson,	1 25	31	38 75	243 33 $\frac{3}{4}$
Jonah Ogelsby,	1 25	31	38 75	448 57
<i>June.</i>				
Alexander Rowan,	1 25	30	37 50	207 33
George Mullen,	1 25	30	37 50	190 96
Frederick Dern,	1 25	34	42 50	339 25
James Blair,	1 25	30	37 50	169 38
George Wike,	1 25	30	37 50	205 48 $\frac{1}{2}$
James Devine,	1 50	30	45 00	229 02
Jeremiah Whitson,	1 25	30	37 50	301 28
Jonah Ogelsby,	1 25	31 $\frac{1}{2}$	39 37 $\frac{1}{2}$	364 38
<i>July.</i>				
Alexander Rowan,	1 50	31	46 50	226 00
George Mullen,	1 50	31	46 50	208 25 $\frac{1}{4}$
Frederick Dern,	1 50	31	46 50	348 12
James Blair,	1 50	31	46 50	200 75
George Wike,	1 50	31	46 50	219 62 $\frac{1}{2}$
James Devine,	1 50	31	46 50	308 68
Jeremiah Whitson,	1 50	31	46 50	480 87 $\frac{1}{2}$
<i>August.</i>				
Alexander Rowan,	1 50	31	46 50	272 38 $\frac{1}{4}$
George Mullen,	1 50	31	46 50	289 56 $\frac{1}{4}$
Frederick Dern,	1 50	31	46 50	354 75
James Blair,	1 50	31	46 50	252 25
George Wike,	1 50	31	46 50	231 50
James Devine,	1 50	31	46 50	389 31 $\frac{1}{4}$
Jeremiah Whitson,	1 50	31	46 50	465 75
<i>September.</i>				
Alexander Rowan,	1 50	30	45 00	257 75
George Mullen,	1 50	30	45 00	297 88
Frederick Dern,	1 50	30	45 00	367 75
James Blair,	1 50	30	45 00	261 00
George Wike,	1 50	30	45 00	240 12 $\frac{1}{2}$
James Devine,	1 50	30	45 00	411 50
Jeremiah Whitson,	1 50	30	45 00	443 80

STATEMENT No. 1—Continued.

NAMES.	Daily pay.	No. of days.	Whole am't. of pay.	Amount of check roll.
<i>October.</i>				
Alexander Rowan,	\$1 50	31	\$46 50	\$212 25
George Mullen,	1 50	31	46 50	263 56
Frederick Dern,	1 50	31	46 50	338 50
James Blair,	1 50	31	46 50	263 75
George Wike,	1 50	31	46 50	220 75
James Devine,	1 50	31	46 50	318 25
Jeremiah Whitson,	1 50	31	46 50	457 90 $\frac{1}{2}$

STATEMENT.

Repairs.

Amount drawn from the treasury for repairs,	\$34,725 01 $\frac{1}{2}$
Amount applied to the payment of debts due, prior to 1st March,	\$7,977 31
Amount expended from 1st March, to 31st October, 1836.	26,746 10 $\frac{1}{2}$
	<u>34,723 41$\frac{1}{2}$</u>
Balance in hand,	\$1 60

Construction.

Amount drawn from the treasury,	\$20,463 53
Amount applied to the payment of debts due, prior to 1st March,	\$14,848 37 $\frac{1}{2}$
Amount expended from 1st March, to 31st October, 1836.	2,478 95 $\frac{1}{2}$
	<u>17,327 33</u>
Balance in hand,	3,136 20

Motive power.

Amount drawn from the treasury,	\$68,855 56
Amount applied to the payment of debts due, prior to 1st March,	\$22,882 11
Amount expended from 1st March, to 31st October, 1836.	44,679 05
	<u>67,562 04</u>
Balance in hand,	1,293 52

New work on old lines.

Amount drawn from the treasury,	\$5,536 69 $\frac{1}{2}$
Amount applied to the payment of debts due, prior to 1st March,	\$682 68
Amount expended from 1st March, to 31st October, 1836.	1,854 01 $\frac{1}{2}$
	<u>2,536 69$\frac{1}{2}$</u>
Balance in hand,	3,000 00

Damages.

Amount drawn from the treasury,	\$7,055 00	
Amount applied agreeably to a resolution of the former board,	550 00	
Balance in hand,	<u> </u>	6,505 00

Retained per centage.

Amount drawn from the treasury,	\$4,288 11	
Amount applied under resolution of the board,	<u>4,288 11</u>	

Ropes.

Amount drawn from the treasury, and unexpended,	1,110 30
-------------------------------------------------	----------

Engineers, Superintendents, &c.

Amount drawn from the treasury,	\$2,872 34 $\frac{1}{2}$	
Amount expended from 1st March, to 31st October, 1836.	2,452 84	
Balance in hand,	<u> </u>	419 50 $\frac{1}{2}$
		<u><u>\$15,466 12$\frac{1}{2}$</u></u>

Amount received from treasurer of board of canal commissioners, at sundry times, by my predecessor, Joseph W. Patton, Esq. and myself.

For motive power,	\$68,855 56	
Repairs,	34,725 01 $\frac{1}{2}$	
Construction,	20,463 53	
New work on old lines,	5,536 69 $\frac{1}{2}$	
Ropes,	1,110 30	
Damages,	7,055 00	
Retained per centage,	4,288 11	
Superintendents, engineers, &c.	<u>2,872 34$\frac{1}{2}$</u>	
		\$144,906 55 $\frac{1}{2}$

Amount expended as per vouchers, filed in Auditor General's office.

For motive power,	\$67,562 04	
Repairs,	34,723 41 $\frac{1}{2}$	
Construction,	17,327 33	
New work on old lines,	2,536 69 $\frac{1}{2}$	
Damages,	550 00	
Retained per centage,	4,288 11	
Superintendents, engineers, &c.	<u>2,452 84</u>	
		129,440 43
		<u><u>\$15,466 12$\frac{1}{2}$</u></u>

No. 4

Report of J. P. Baily, relative to avoiding the
Plane at Columbia.*Harrisburg, October 31, 1836.**Board of Canal Commissioners.*

GENTLEMEN—A careful survey has been made to avoid the inclined plane at Columbia, agreeably to your instructions; and I respectfully submit the accompanying plan of the proposed alteration, and the subjoined estimate of the cost. The estimate I believe to be a full one.

The line might be taken in west of Mount Pleasant, and save ten thousand dollars or thereabouts. But the summit south of Mount Pleasant is twenty-six feet lower; and the advantage afforded to the motive power, by avoiding this additional height, to overcome on this portion of the road, and the more favorable direction of the route, and as the estimate comes entirely within the cost allowed by law. I most earnestly recommend it to the board. The front street route affords easy access to the bridge on a grade not over fifty feet to the mile, and with a curve above 300 feet radius. I believe, so far as I could learn, that damages will be released on the whole route.

I have the honour to be,

Very respectfully your obedient servant,
JOHN P. BAILY, *Engineer.*

ESTIMATE.

100,706 cubic yards excavation, at 28 cents,	\$28,197 68
107,602 " embankment, 25	26,900 00
20,000 " excavation at Mount Pleasant, at 36 cents,	7,200 00
15,500 " thence to intersection at 30 cents	4,650 00
1,000 perches masonry, at \$3	3,000 00
Cost of grading.	<u>\$69,947 68</u>

Taking up old track and laying six miles of railway.

ESTIMATE.

1,920 rods taken up, and hauled over, at 4 dollars,	\$7,680 00
15,840 locust sills, at 50 cts.	7,920 00
1,920 rods laying, at \$7,	13,440 00
Add one quarter of a mile additional, through Front street, to be of wood,	3,200 00
Cost of superstructure,	32,240 00
Add cost of grading,	69,946 68
	<hr/>
	\$102,187 63
Add ten per cent. for contingencies, salaries of engineers, superintendents, &c.	10,218 76
	<hr/>
Total cost,	<u>\$112,406 44</u>

I respectfully accompany this with a list of persons who have released damages.

J. P. BAILY.

We the subscribers do hereby release and forever discharge the commonwealth of Pennsylvania, from all damages which we may sustain, by making a rail road to avoid the inclined plane at Columbia, provided it commences at or near the south east end of the canal bason at Columbia, thence down Front street to a little below James Wright's dwelling house, thence curving to the left, and pursuing the course agreeable to a survey made by Joshua Scott, by order of John P. Baily, engineer in chief of the public works of the commonwealth, crossing Shawne run near the old mill and the inclined plane near the foot of it, thence to the valley of Strickler's run, thence crossing Strickler's mill dam, and up the south side of said run, passing near Abraham Zook's and Christian Bachman's mills, thence to such point on the Columbia and Philadelphia rail road as the said John P. Baily may think proper.

In witness whereof, we have hereunto set our hands and seals, the twenty-first day of October, A. D. 1836.

WM. WRIGHT,	[L. s.]	JAMES GIVEN,	[L. s.]
JAMES CRESSON,	[L. s.]	Buildings excepted.	
JOHN L. WRIGHT,	[L. s.]	PHEBY WITHERS,	[L. s.]
JNO. BARBER,	[L. s.]	Buildings excepted.	
ANDREW BEITER,	[L. s.]	HENRY H. STRICKLER,	[L. s.]
A. BRUNER,	[L. s.]	O. B. GOODMAN,	[L. s.]
Buildings excepted.		Buildings excepted.	
JEREMIAH BROWN,	[L. s.]	BRIGET McTAGUE,	[L. s.]
		Buildings excepted.	

Witness present—ROBT. WRIGHT.

GETTYSBURG EXTENSION, PENNSYLVANIA RAIL- WAY.

No. 5.

Report and Estimate of John P. Baily, Principal Engineer.

ENGINEER DEPARTMENT,

Harrisburg, Nov. 20, 1836.

To Moses Sullivan, Esq. President, Board Canal Commissioners.

SIR—The following annual report, is respectfully submitted:

My original appointment embraced a general supervision of the Columbia rail way, the Portage rail way, the Delaware division of the canal, and the canal from Columbia to Hollidaysburg. Subsequently the board directed me to make a survey of the Gettysburg rail way, and to prepare a portion of it for contract. The latter work seemed to require all my attention, till it was let, on the 6th ult. For information respecting the management of the old works, the board is respectfully referred to the reports of the several superintendents.

The board also directed me to cause a survey to be made to avoid the Columbia inclined plane. This has been attended to, and the work advertised by order of the board, to be let on the 30th inst; cost estimated at one hundred and twelve thousand four hundred and six dollars and forty-six cents. The board will please refer to my report of the 31st ult respecting this work. The new location is actually six hundred feet shorter than the old road, and the grade not exceeding thirty-five feet per mile. The attention of the board is respectfully recalled to the situation of Maul's bridge, on the Columbia road, and to the tow-path bridge at Duncan's Island. One track of the latter is stopped up by braces which have been put in to support the bridge. The truss timbers are sound, and the truss work vertically is strong. There is little depression in any of the spans and some of them are upwards of two hundred and twelve feet. The bridge might be straightened and strengthened to answer till a new one can be built. I have not made an estimate of the cost of a new one. It can be furnished should the board desire it.

Estimate of the cost of the Gettysburg Rail Road.

The sections under contract, twenty in number, embracing twenty two and a half miles, commence at the summit of the mountain and ends in Gettysburg.

Section 1.

60,773 cubic yards,	excavation,	at 9 cents,	\$5,469 57
28,194 "	embankment,	14 "	3,977 16
2,000 "	solid rock,	59 "	1,180 00
8,000 "	detached rock,	24 "	1,920 00
120 feet,	cross drains,	100 "	120 00
80 rods,	grubbing,	1,50 "	120 00
			<hr/>
			\$12,756 73
			<hr/>

Section 2.

40,133 cubic yards,	excavation,	at 11 cents,	4,414 63
71,997 "	embankment,	12 "	8,639 64
2,033 "	solid rock,	55 "	1,118 15
5,069 "	detached rock,	28 "	1,418 76
115 feet,	cross drains,	1,00 "	115 00
60 rods,	grubbing,	1,50 "	90 00
			<hr/>
			\$15,796 18
			<hr/>

Section 3.

245,668 cubic yards,	excavation,	at 12 cents,	29,489 16
309,340 "	embankment,	12 "	37,120 80
10,112 "	solid rock,	60 "	6,067 20
30,213 "	detached rock,	26 "	7,855 38
300 feet,	cross drains,	50 "	150 00
6,600 cubic yards,	tunnel,	3,00 "	19,800 00
1,000 perches,	masonry,	3,00 "	3,000 00
			<hr/>
			\$103,473 54
			<hr/>

Section 4.

102,267 cubic yards,	excavation,	at 12 cents,	12,272 04
68,545 "	embankment,	10 "	6,854 50
4,100 "	solid rock,	50 "	2,050 00
30,534 "	detached rock,	28 "	8,549 51
120 feet,	cross drains,	1,50 "	180 00
50 rods,	grubbing,	1,50 "	75 00
			<hr/>
			\$29,981 06
			<hr/>

Section 5.

68,742 cubic yards,	excavation,	at 12 cents,	8,249 04
71,757 "	embankment,	10 "	7,175 74
4,170 "	solid rock,	50 "	2,085 00
20,200 "	detached rock,	28 "	5,656 00
120 "	cross drains,	1,50 "	180 00
160 rods,	grubbing,	1,60 "	256 00

\$ 13,601 78
Section 6.

75,034 cubic yards,	excavation,	at 12 cents,	9,004 08
28,763 "		12 "	3,452 04
3,210 "	solid rock,	56 "	1,797 60
7,824 "	detached rock,	28 "	2,190 72
175 rods,	grubbing,	2,00 "	350 00

\$ 16,794 44
Section 7.

119,618 cubic yards,	excavation,	at 13 cents,	15,550 34
148,041 "		13 "	19,245 32
5,109 "	solid rock,	47 "	2,401 23
30,709 "	detached rock,	27 "	8,291 43
265 feet,	cross drains,	2,75 "	728 75
40 rods,	grubbing,	1,00 "	40 00

\$ 46,257 08
Section 8.

105,484 cubic yards,	excavation,	at 11 cents,	11,603 24
194,672 "		12 "	23,360 64
4,321 "		57 "	2,462 97
15,575 "	detached rock,	28 "	4,361 00
100 "	cross drains,	50 "	50 00
94 rods,	grubbing,	1,50 "	141 00
8,800 cubic yards,	tunnel,	2,30 "	20,240 00
1,076 perches,	masonry,	2,90 "	3,120 40

\$ 65,339 25
Section 9.

110,300 cubic yards,	excavation,	at 11 cents,	12,133 00
108,902 "		12 "	13,068 24
4,172 "	solid rock,	55 "	2,294 60
15,488 "	detached rock,	25 "	3,872 00
300 feet	cross drains,	1,50 "	450
160 rods,	grubbing,	1,50 "	240

\$ 32,057 84

Section 10.

64,708 cubic yards,	excavation,	at 8 cents,	5,176 64
94,121 "	embankment,	13 "	12,235 75
4,121 "	solid rock,	50 "	2,060 50
8,822 "	detached rock,	20 "	1,764 40
320 feet,	cross drains,	1,33 "	425 60
60 rods,	grubbing,	1,50 "	90 00
			<hr/>
			<u>\$ 21,752 89</u>

Section 11.

71,319 cubic yards,	excavation,	at 9 cents,	6,418 71
80,965 "		16 "	12,954 40
4,256 "		51 "	2,170 56
15,326 "		30 "	4,597 80
			<hr/>
			<u>\$ 26,141 47</u>

Section 12.

17,170 cubic yards,		at 12 cents,	2,060 40
21,724 "		13 "	2,824 12
500 "		58 "	290
1,533 "		20 "	306 60
40 feet,	cross drains,	54 "	21 60
			<hr/>
			<u>\$ 5,502 72</u>

Section 13.

12,675 cubic yards,	excavation,	at 12 cents,	1,521
9,420 "		10 "	942
310 "	solid rock,	50 "	155
2,431 "	detached rock,	25 "	607 75
30 feet,	cross drains,	1,50 "	45 00
			<hr/>
			<u>\$ 3,270 75</u>

Section 14.

25,463 cubic yards,	excavation, at	11 cents,	\$2,800 93
19,142 "		11 "	2,105 62
712 "	solid rock,	51 "	363 12
5,634 "	detached rock,	31 "	1,746 54
34 feet,	cross drains,	\$1 50 "	51
			<hr/>
			<u>\$7,067 21</u>

Section 15.

19,821 cubic yards,	excavation, at	11 cents,	2,180 31
20,639 "		12 $\frac{1}{2}$ "	2,579 87

911 cubic yards	solid rock,	at 65 cents,	592 15
4,746	" detached rock,	27 "	1,281 42
45 feet,	cross drains,	90 "	40 50
			<hr/>
			<u>\$6,674 25</u>

Section 16.

18,616 cubic yards,	11 cents,	2,047 76
20,423 "	11 "	2,246 53
471 "	56 "	263 76
3,217 "	27 "	868 59
75 feet, cross drains,	60 "	45
		<hr/>
		\$5,471 64

Section 17.

17,599 cubic yards,	at 10 cents,	1,759 90
12,119 " "	12½ "	1,514 87
411 " "	30 "	123 30
3,602 " "	27 "	972 54
55 feet, cross drains,	1,87½ "	103 08
		<hr/>
		\$4,473 69

Section 18.

35,383 cubic yards,	10 cents,	3,538 30
30,203 “	10 “	3,020 30
1,170 “	50 “	585
8,710 “	24 “	2,090 40
55 feet, cross drains,	1.20 “	66
		<hr/>
		\$9,300 00

Section 19.

18,732 cubic yards,	9 cents,	1,685 88
14,294 “	12 “	1,715 28
1,324 “	37 “	489 88
3,611 “	18 “	649 98
55 feet, cross drains,	1,12 $\frac{1}{2}$ “	61,87 $\frac{1}{2}$
		<hr/>
		\$4,602 89 $\frac{1}{2}$

Section 20.

40,820 cubic yards,	at 11 cents,	4,490 20
41,307 "	13 "	5,369 91
2,721	59 "	1,605 39
9,908	29 "	2,873 32
		<hr/>
		\$14,338 82

Masonry.

3,575 perches, at	Tom's creek,	at \$3 50	\$12,512 5
1,228 "	Myers run,	3 00	3,684
369 "	Marshall's run,	2 50	922 5
444 "	West marsh creek,	3 75	1,665
228 "	Beesaker's run,	2 75	627
56 "	Heintzleman's run,	2 25	126
444 "	North Marsh creek,	4 25	1,887
471 "	Willoughby's run,	4 25	2,001 7

\$23,425 7.

Total cost of grading $22\frac{1}{2}$ miles, \$478,079 9

ESTIMATE,

For grading West of the mountain, by the Smith Town route.

Section No. 1,	\$8,763 4
" 2,	10,974 1
" 3.	51,824
" 4,	19,784 1
" 5,	16,773 2
" 6,	15,791 8
" 7,	35,824
" 8,	28,140
" 9,	17,214 1
" 10,	14,921 1
" 11,	19,476 1
" 12,	6,172 2
" 13,	3,690 4
" 14,	6,024 1
" 15,	8,957 1
" 16,	7,124
" 17,	5,172 1

\$276,626 24

Masonry.

1,794 perches, at	Falls run,	at 3 50	\$6,279
1,276 "	Oumers run,	3 50	4,466
240 "	Cave town run,	2 50	600
510 "	Anteitem creek,	4 25	2,167 50

\$290,138 74

Estimate of the cost of one mile, single track of railway.

760 cross ties,	at 50 cents,	880
1,054 feet, mud sills,	4 "	402 16
84 tons iron edge rail,	80 00 "	6,720
1,520 pounds brad spikes,	10 "	352
1,080 " splicing chairs,	4 "	563 20
320 rods laying,	2 00 "	640

\$9,557 36

Multiply by

41 $\frac{3}{4}$

Cost of 41 $\frac{3}{4}$ miles, single track,	399,019 78
Added cost of grading east of mountain,	478,079 99
" " west of mountain,	290,138 74

\$1,167,238 51

Added 10 per cent. for contingencies,

116,723 85

Total cost,

\$1,283,962 36

The route by Waynesburg increases the distance $5\frac{1}{2}$ miles. The cost of grading the Waynesburg route for an equal distance, is so nearly the same as grading the Smithtown route, that the above estimate may be assumed at the cost of an equal distance by Waynesburg. The average cost of grading the remaining $5\frac{1}{2}$ will be \$ 4,000 00 per mile.

Making for $5\frac{1}{2}$ miles,

\$ 22,000 00

Add $5\frac{1}{2}$ miles of rail way,

52,565 48

\$ 74,565 48

Add ten per cent. for contingencies,

7,456 54

Extra cost by the Waynesburg route,

\$ 82,022 02

With an increase of distance of $5\frac{1}{2}$ miles.

The greatest grade is fifty feet per mile; thirteen miles at this grade to ascend the mountain, and thirteen miles to descend. The least radius of curvature is one thousand feet. There are two curves on the east side of the mountain with this radius. The one at Tom's creek, and the one represented on the map a little east of the summit. The two make about half a mile; the curve round the point of Jack's mountain, for a quarter of a mile has a radius of twelve hundred and fifty feet; the least of the remaining curves is two thousand feet; the large sweeps are seven thousand five hundred feet, and fourteen thousand feet. The grades are reduced on the curves to allow for increase of friction, so that the engine will not be required to exert greater power on curves than on straight lines. Present improved engines, weighing eleven tons, will ascend the mountain with a gross load of ninety tons at the rate of ten miles per hour.

There seemed to be no route to pass the mountain so favorable as the present one, and the summit is much the lowest. I examined the country towards the head of Marsh creek and the Connewaga, and the summit at Newman's where these streams head. The route by either, would be circuitous and the distance much increased, and the mountain more broken. I was directed by the board to take the most direct and most favorable route. The present route is direct and must be considered favorable, and the cost not great, inasmuch as it passes a mountain seven hundred and seventy-six feet high, indented with deep ravines.

It is anticipated that this road will be a vast thoroughfare of immense advantage to the lower counties of the state and to Philadelphia. Great pains were taken to limit the grades to fifty feet per mile, and the curves to two thousand feet radius. Three short curves mentioned above, were unavoidably less, but they occupy a small portion of the road. The expense was thus considerably increased; but the immense advantage that it will for ever be to the road, will much more than compensate for the additional cost, and it was thought better to have it done right at first, than for it to be for ever afterwards subject of complaints. The times are high, the price of labor increased one third owing to scarcity of hands and provisions, and the price of iron is doubled. Deduct one fourth from the above cost for grading, to allow a rise of one third in prices, and deduct \$35 per ton from the cost of the iron, and the estimate would be \$312,980 08 less than it now is, making the cost \$962,976 15, instead of \$1,283,962 36.

Length of road to Hagerstown by Smithtown,	41 $\frac{3}{4}$ miles.
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“ “ “ Waynesburg,	47 $\frac{1}{4}$ “
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There are two short tunnels each thirty-six rods long.

All of which is respectfully submitted,

JOHN P. BAILY, *Engineer.*

WESTERN, BEAVER AND FRENCH CREEK DIVISIONS.

No. 9.

Report of Charles T. Whippo, Principal Engineer upon Beaver Division.

To the Board of Canal Commissioners.

GENTLEMEN—Permit me herewith to present you with the following report, in regard to the Beaver division, Pennsylvania canal.

When this line was placed under my care last spring, I found it in a ruinous condition.

In consequence of the extraordinary high flood of last fall, and

several other floods which followed it, very serious injury was done to nearly the whole line, and particularly to the dams. The towing paths along the Shenango pool, above New Castle, was in several places, and to a considerable extent, washed entirely away; and in other places the top carried off from a foot to two or three feet in depth. At New Castle, the water raised on to the top of the towing path, and great fears were entertained that it would break through and inundate the town, and would perhaps have done so, had not the supervisor opened a channel for it on the opposite side. But this, though perhaps the best expedient that could have been adopted, was nevertheless attended with very serious consequences. The course of the river was in a short time changed, and the whole of the current passed round the western end of the dam, in the new channel which had been formed for it. Dam No. 2, at Hard Scrabble, was considerably undermined at both ends and settled; and at the western end the water got entirely under it, and washed out the foundation to the depth of near thirty feet. The abutment at that place, and the protection wall between the lock and the river on the opposite side, were also undermined and fell down. The top of the guard bank below lock No. 7, was carried off and deposited in the channel below the lock, nearly filling it up. The re-action of the water below dam No. 3, had partially undermined it, particularly at the west end, and many of the timbers were split and broken, and others displaced. One of the piers of the Conoquenessing towing path bridge, was nearly thrown down, and the superstructure displaced and otherwise injured. Dam No. 4, though upon a rock foundation, was also considerably injured. At the foot of the dam, large masses of rock were torn up by the overfall of the water, and at the east end for the space of about thirty feet, an excavation was made in the rock about nine feet deep, and a portion of the filling washed out, so that the dam at that place sunk several inches. From this dam to the guard lock, a distance of about 800 feet, the bank next the river was originally made very high, in order to prevent the water in flood times from getting over; and it was thought at the time to be sufficiently strong, but in this I was disappointed. It having a smooth rock to rest upon, the water found its way between it and the earth, and the whole embarkment, with the exception of about 200 feet was carried away, immediately after which its place was supplied with a timber crib. This took place in the fall and winter of 1835, while Mr. Welch had charge of the line. The crib work however, was not entirely completed.—It was not quite high enough, and not filled with stone, so that during a heavy flood of last spring, the greatest portion of it was carried away, making one of the most serious breaches, we have at any time had upon this division. A small portion of the stone filling of dam No. 5, was washed out and a few of the spars of dam No. 6 were torn off. The outlet lock was partially filled with sand and gravel and one of the gates out of repairs.

In this state of things it was evident that extensive repairs would be necessary, and a heavy expense incurred.

We considered it best to omit making any repairs wherever we could safely do so, and attend to such only as were indispensably necessary.

In conformity with this principle, we merely made the towing-path passable, raising that at New Castle however, so as to prevent the recurrence of any danger of high floods. In regard to the dam at this place it was thought best to extend it, which was accordingly done to the distance of 282 feet. This will double the length of the weir, and lessen the rise of the water upon it in the same proportion, so that with having the towing-path considerably raised and strengthened as it has been, there can never be any danger from any rise of water, such as has ever been known in this stream. This dam is now entirely completed, and the work has been done in a substantial manner.

Dams No. two and three are also nearly completed, and although they have required a great deal of labor and materials, and the expense has been correspondingly great; yet I have the satisfaction of assuring the board that the work has been done in a substantial manner, and that I feel the greatest confidence in its permanency and security. For this result we are indebted in a great measure to the indefatigable exertions of Mr. J. W. Maynard, one of the principal contractors for the work, who has discovered a zeal and ability for such an undertaking which very few possess. Mr. J. M. Lukens, another of the contractors, was industrious and attentive, and comes in for a due proportion of the credit.

There has not been as much gravelling done upon these dams as would have been desirable, owing in part to the water being so high as to prevent boats from going on to them with safety, but principally for the want of money. This, as the board will perceive, forms an item in my estimate for labour to be done on this line during another season.

The Conoquenessing bridge has also been repaired. The shattered pier has been taken down and rebuilt; and the superstruction replaced. At dam No. 4, a crib is sunk in the place which had been excavated by the overfall of water, and covered over with strong timbers laid close together, and sloping down stream, so as to permit the water to pass freely off. The stone filling has also been replaced, and the dam made safe against future floods. It should however be remarked, that in consequence of the accumulation of gravel at the mouth of the Conoquenessing creek below lock No. 8, which makes the water too shallow at this place during the dry part of the season for heavy laden boats, it will be necessary to raise this dam about eighteen inches. This would have been done this season, only that we did not consider it of immediate importance; and besides, we did not like to divert our time and means from other objects which were of more immediate importance. It may be asked, would it not be better to excavate the gravel instead of raising the dam? My answer is, I think not; for besides the difficulty of excavating the gravel, the bottom at this place, which is of solid rock, is not as low as it should be by about one foot. At the time that we were about completing the

work here in the fall of 1833, owing to our contractor not getting along as fast as we could have wished, and the rainy season coming on sooner than was usual, we were prevented from taking out the bottom as deep as was intended; and since then it has been found to be impracticable. It was attempted once, but could not be done, owing to the bad quality of the rock for blasting, and the depth of water over it.

The breach below this dam, and above the 9th lock, has been repaired by a timber crib, made similar to our dams upon this line, and thoroughly paved on the top with stone. As I mentioned above, the embankment, with the exception of about two hundred feet, had been carried away, and a large proportion of the crib which had been substituted was carried away with it; and as it appeared difficult, if not impossible to connect the timber work with the earth, I had the remaining embankment removed, and supplied its place with the crib above mentioned. The work has been done in the most substantial manner, for which the contractor, Mr. George D. Foreman, deserves much credit.

The stone filling of dam No. 5, has been replaced; but it will have to be sparred over during another season. The flood wood and saw logs, which come down in great quantities in times of high waters, have already split and broken many of the longitudinal breast timbers of the dam; and the sparring will be necessary to prevent the more serious effect of the same cause.—Dam No. 6 has also been repaired, and also the outlet locks.

The following is the estimate for repairs, which I think will be necessary for another season, viz:

Towing-path above New Castle, along the Shenango pool,	\$2000 00
Cleaning out bottom of canal from New Castle to the 6th lock,	300 00
Repairing towing-path to the 7th lock,	100
Gravelling dam No. 2, and other repairs,	2000
Cleaning out below 7th lock, and repairing towing path to dam No. 3,	400
Gravelling dam No. 3, and other repairs,	2000
Repairing and raising towing-path from dam No. 3 to dam No. 4,	2000
Raising dam No. 4, and gravelling,	4500
Repairing towing path to dam No. 5,	100
Sparring dam No. 5,	1600
Repairing canal and towing-path to dam No. 6,	200
Repairing dam No. 6 and outlet locks,	500

\$15,700 00

Our canal, locks and aqueducts, are, and have been from the beginning, in good repair. I presume no line in the state has suffered less, so far as regards these, as ours has. The work was well done,

and fully answers our expectations. The great injury upon this line has been done to the dams, and the slack water navigation; and here has been the great expense for repairs. These remarks, I believe, will apply to all the lines in the state, where slack water navigation has been used. The dams have not only been very expensive in the original construction, but they have cost, and are continuing to cost, almost incredible sums of money to renew and keep them in repair. This results from the necessity, in many instances, of building upon gravel or sand foundations, and from the magnitude and almost irresistible force of our rivers in times of floods. Where such streams are to be contended with, the wisdom, the foresight and experience of the ablest engineers are of little avail. No man can pretend to calculate for, or provide means to resist the force of floods, of from twenty to thirty feet in height, running at the rate of seven or eight miles per hour, and charged, as they frequently are, with extensive accumulations of flood-wood and ice. I, however, have the pleasure of assuring the board, that after the repairs above alluded to shall have been made, our whole line will be remarkably permanent and secure. The two dams at New Castle, though on gravel foundations, are, I think, perfectly safe. The streams here, though frequently very high and rapid, are far inferior in these respects to the Beaver.

Dams No. 2 and 3, which have been repaired this summer, it does appear to me, are also safe. They have each a base of about seventy feet; and, having been put together in the most substantial manner, their failure cannot reasonably be anticipated. The graveling above alluded to, is not so much for increasing their security as for making them tight. The Beaver, in the dry part of the season, becomes very low, and unless the dams are tight, the levels cannot be kept up. All our other dams are upon rock foundations; and are of course less liable to injury than the others. With a little attention, and making the requisite repairs, at the proper times, they will stand as long as the materials of which they are composed will last.

Very respectfully,

CHARLES T. WHIPPO.

CANAL OFFICE, NEW CASTLE, }

November 11, 1836. }

SUSQUEHANNA, NORTH AND WEST BRANCH DIVISION.

No. 12.

Report and Estimate of Charles T. Whippo, Principal Engineer, Shenango line.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN:—I herewith submit to you my report and estimate of the Erie extension of the Pennsylvania canal, south and west of Conneaut lake.

My first business after my appointment, was to organise a corps of engineers. I engaged Mr. Henry C. Moore, to act as principal assistant; and after making other necessary arrangements, we commenced the survey, at the head of slackwater navigation, six miles above New Castle, on the 26th day of April last; and proceeded up the valley of the Shenango, on the east side of it, in the direction of Erie. We continued on this side as far as Greenville, a distance of forty-one and three-fourth miles. Here we crossed what is called the Little Shenango, leaving the main branch to the left, and continued up the former stream three and three-fourth miles, to the mouth of Crooked cutting thence up on the west side of this stream to Pymatuning swamp. We then went thence by way of Beaver Dam summit, to within two miles of Conneaut lake, making a distance of sixty miles in all.

We divided the line into stations of two hundred and sixteen, each, and into sections of twenty-four stations each, commencing at the place of beginning.

The ground with the exception of that at the Beaver Dam summit and a few other places, is favorable for the construction of a canal. The Shenango valley, as far as Greenville, is generally wide, and the bottoms low and level. The stream is remarkably serpentine, and frequently winds entirely across the bottoms, from hill to hill. At these places, we are generally obliged to construct the canal in the river, and protect its out side with slope wall; and in some few instances we occupy so much of the bed of the river, that a new channel has to be made for it. The canal line for the most part passes along at the margin of the bottoms, and very frequently through low swampy land.

This enables us to take in a great number of small streams of water; many of which are durable and will be very useful as feeders. There are many others however, which it would be more desirable to leave out; but this can very rarely be done, on account of the small difference between the surface of the ground over which we have to pass, and the water in the river. Where such streams are taken in,

it is intended to construct weirs of such length as to allow the surplus water to pass off without injuring the canal. At Sharp's mill, on section No. 21, we take in the first feeder, by a dam twelve and a half feet high and two hundred and fifty feet long. This, with the supplies from small streams above alluded to, will be amply sufficient for this portion of the line. The pool occasioned by this dam will be five miles long, and will give us three miles of slack water navigation, and thus enable us to pass over at a moderate expense, one of the most difficult portions of the line, for the construction of a canal. The hill here extends close up to the creek and rises high and steep. On section No. 31, we have our second dam. The object of this dam, is to make slack water navigation around a difficult point along the big bend of the Shenango, where the construction of a canal would be almost impracticable, or at least attended with a heavy expense. Dam No. 3, is located at Greenville, a little below the junction of the Big and Little Shenango creeks. It will flow back the water as far as the line of canal, and thus enable us to cross the little Shenango, upon the pool and a towing path bridge.

Dam No. 4, is at Loutzenheiser's mill, on section No. 44. It gives us slack water as far as Williamson's mill, one and one sixth miles, where we have our fifth and last dam upon this line. These two dams are indispensable, both as feeders, and to make slackwater navigation, where, from the nature and situation of the ground, a canal would be attended with an unwarrantable expense. It should be remarked also, that the general objection to slack water navigation in Pennsylvania, the first so far as I know, does not apply here. This stream is comparatively small, and I have no doubt, dams can be built upon it, that will be both safe and permanent. This brings us to the valley low forked creek, which extends seven and two-third miles, to Hartstown and is one of the handsomest and most favorable districts of country, for the location of a canal, which I have ever seen. The great difficulty we meet with is a scarcity of water; and this we are enabled to overcome by taking in the creek on section No. 51, a little below Owrytown, and making an extensive reservoir at the lower end of Pymatuning swamp. On our way from Hartstown, to the Beaver Dam summit, we run along for about two miles on the west side of the swamp, and then cross over in a north easterly direction on a succession of islands, as they are called, thus taking in a little more than four hundred acres. The ground along the margin of the swamp, is generally pretty steep, so that very little good land will be overflowed. The swamp itself is, at present a perfect desolation, and the fit haunt of wild birds and beasts of prey. The timber and brush will have to be cleared off at a considerable expense, and the water will flow over it to the depth of about eleven feet.

The Beaver Dam summit, as it is called, is altogether the most difficult point upon this line; the deep cutting commences at the fourteen hundred and fiftieth station, and continues to the fourteen hundred and sixty-sixth inclusive, making a distance of two hundred and eight perches in all. The deepest cutting is at the fourteen hundred and

fifty-fourth station, where it is twenty-six feet deep. The material through which we have to pass, will be muck, gravel, clay and marl.

In the construction of this line, there will be four mills destroyed, viz: Carver's near Sharon, Donaldson's, on section No. 38, Loutzenheiser's, one mile above Greenville and Williamson's on section No. 45. The water power at Carver's is the only one that will be injured, and it will be entirely destroyed. At Donaldson's it will be necessary to take down the mill and rebuild it near the creek, the expense of which will be but small. At Loutzenheiser's, the mill will be taken down; here, by the erection of our dam, we increase the water power to nearly double. At Williamson's also, the mill will be taken down, but it may be rebuilt on the south side of the creek, if the board will permit.

Forty-five and one half miles of the lower portion of this line was put under contract on the 6th of September last, but owing to the uncommon high prices of labor and provisions in this part of the country, a number of contracts have been abandoned. At this time there are thirty-six sections, twenty locks, four dams, and one aqueduct in progress. The sections are all partially grubbed and some excavation has been done on the eighth, ninth, eleventh, sixteenth, thirty-eighth, thirty-ninth, forty-third and forty-fifth. The lock contractors have been engaged principally in getting out and cutting stone, and some have commenced digging foundations and procuring timber and plank.

Lock, No. 1, at the head of slack water above New Castle, was placed under contract on the 13th of August last, with a view of getting in the foundation and lower portion of the wall before the water was raised by the dam then being built at New Castle, but sufficient time did not elapse to admit of this. The contractors have, however, succeeded in getting in the foundation, so that it can be built next year without difficulty.

Appended to this report, the board will find a detailed estimate of that part of the line now under contract, and also of the remainder of the line to the fourteen hundred and sixty-sixth station near Conneaut lake. These estimates have been made with great care, and in reference to the high prices of all kinds of labor, provisions and materials in the country, and I have no doubt they will be found to be correct, unless there should be a change in these prices. At the end of the estimates is a summary statement, shewing the number of sections, locks, dams, aqueducts, towing path bridges, waste weirs, culverts, road and farm bridges, lock houses and the amount of fence, with their costs, together with the Crooked creek feeder and dam; also, the aggregate cost, distance and lockage, and the average cost per mile.

The line under contract has been divided into four sub-divisions of about eleven miles each, and an assistant engineer with a target man and axe man placed upon each sub-division, whose duty it is to be constantly on the line, to lay out work for the contractors, and to see that it is faithfully executed. The whole is under the general supervision of one principal assistant engineer; his duty is to travel along

the line of canal and give directions to the assistants, explain the different plans and specifications, to direct and control the contractors in the management and execution of their work, and to make the monthly estimates under the different contracts.

The following is a list of the names of these assistants, together with the target men, axe men, &c.

Principal Assistant—Henry C. Moore.

Assistants—William Hilands, Washington C. Malin, Thomas Fisher, George Morton.

Target Men—Alfred R. Moore, Martin Agnew, John Seidle, James Oliver.

Axe Men—Charles Pearson, Ezra H. Iddings, John R. Fisher, Joseph Woodworth.

Mr. Moore has been engaged in engineering since 1831, and was with me in the summer of 1835, on a portion of the Wabash and Erie canal, in the state of Indiana. He has, therefore, had much experience in the line of his profession, and justice requires me to add, that having had the immediate charge of the locating party this summer, his services have been of the utmost importance to me. He has been industrious, faithful and accurate, and has displayed much judgment and skill in the various departments of his profession. The other young men stand deservedly high, for acquirements and moral worth.

All of which is respectfully submitted.

CHARLES T. WHIPPO, *Principal Engineer.*

ENGINEER'S OFFICE, NEW CASTLE, }
November 18, 1836. }

Estimated cost of that part of the Erie extension now under contract between the head of the slackwater above New Castle and the mouth of Crooked Creek.

SECTIONS.

No of sections.	L'gth in stations.	Estimated cost.	REMARKS.
1	24	\$4,509 45	{ Head of slackwater, 6 miles above New Castle.
2	24	10,500 50	
3	24	5,003 56	
4	24	7,159 62	
5	24	5,738 48	
6	24	5,282 00	Passes through Pulaski.
7	24	14,331 30	Built partly in the river.
8	24	11,303 34	Do
9	24	4,056 00	
10	24	14,173 00	Built partly in the river.
11	24	10,386 00	Do
12	24	4,678 00	Do

SECTIONS—Continued.

No of sections.	L'gth in stations.	Estimated cost.	REMARKS.
13	24	\$8,128	
14	24	3,324	
15	24	4,720	
16	24	7,993 50	
17	24	6,845	Sharon.
18	24	6,663	
19	24	12,351 50	Canal partly in the river.
20	24	13,783 75	Do
21	24	6,434	Dam No 1, slackwater.
22	24	2,530	Slackwater.
23	24	3,192	Do
24	24	14,258 25	Canal built partly in the river.
25	24	10,565	Do
26	24	8,334	Clarksville.
27	24	7,317 50	
28	24	5,412	
29	24	5,714	
30	24	4,319	
31	24	5,422	{ Dam No 2, slackwater 2½ miles in Big Bend of Shenango,
32	24	8,876	
33	24	8,924 40	
34	24	5,917	
35	24	12,800 25	Canal built partly in the river.
36	24	4,758	
37	24	5,704	
38	24	9,265 50	
39	24	4,576	
40	24	7,114 25	
41	24	7,722	
42	24	4,656	
43	24	7,017	Passes through Greenville.
44	24	5,108 16	
45	24	3,461 88	Slackwater.
46	32	3,052 80	Slackwater, mouth of Crooked creek.
		<u>\$333,380 99</u>	

LOCKS.

No.	Location.	Lift.	Guard.	Cost.	REMARKS.
1		9 feet	none	\$11,722 50	
2	Sec. No. 2	9	"	10,776 40	
3	"	6	"	10,353 12	
4	"	9	"	9,403	
5	"	12	"	9,796 87½	
6	"	13	"	10,252 50	
7	"	14	"	9,846	
8	"	17	"	10,213 50	
9	"	20	"	10,140	
10	"	21	8 feet	9,210	
11	"	24		12,210	
12	"	26		9,262 84	
13	"	28		9,612	
14	"	31	8	12,350	
15	"	33		10,836	
16	"	34		9,375	
17	"	35		10,630 48	
18	"	36		10,129 60	
19	"	40		9,028 55	
20	"	41		9,458 85	
21	"	43	7	8,385	
22	"	43		8,321 60	
23	"	43		8,634 60	
24	"	44	6	11,164	
25	"	45	6	13,423	
26	"	46		8,886 50	
Total lockage,		<u>174¼ ft.</u>		<u>\$263,423 51</u>	Total cost of locks.

DAMS.

No.	Location.	Length.	Height.	Cost.	REMARKS.
1	Sharp's mill,	250 ft.	12½ ft.	\$13,582 48	Rock bottom,
2	Big bend,	200	9	9,403 73	Gravel bottom,
3	Greenville,	230	7¼	5,555 12½	Rock bottom,
4	Loutzenheiser's	240	13	11,885 06	" "
5	Williamson's,	190	10½	9,309 55	" "
				<u>\$49,735 94½</u>	Total cost of dams.

AQUEDUCTS.

No.	Over what stream.	Length.	No. of spans.	Cost.	REMARKS.
1	Piper's run,	91½ ft.	3	\$6,931 40½	Abutments and piers of rusticated masonry, and superstructure of wood.
2	Anderson's run,	"	3	6,931 40½	
3	Saw mill run,	"	3	7,431 40½	
<u>\$21,294 21½</u>					

TOWING PATH BRIDGES.

No.	Location.	Length.	No. of spans.	Cost.	REMARKS.
1	Section No. 21	20 ft.	1	\$378 70	Stone Abutments,
2	"	22 30	1	624	
3	"	22 30	1	624	
4	"	22 20	1	594	
5	"	32 30	1	624	
6	"	32 30	1	624	
7	"	33 20	1	594	
8	At Greenville,	172	4	2,435 44	Across Little Shenango
on	Section No. 1	20	1	825	
<u>\$7,323 14 Total.</u>					

WASTE WEIRS.

No.	Location	Length.	Cost.	Remarks.
1	Sec. No. 2	50 feet.	\$ 752 37½	{ Built with cut stone abutments.
2	"	3 50	752 37½	
3	"	8 50	752 37½	
4	"	10 80	951 46	
5	"	12 100	1,242 47½	
6	"	12 80	951 46	
7	"	15 60	818 34	
8	"	17 60	818 34	
9	"	18 50	752 37½	
10	"	20 50	752 37½	
11	"	26 80	951 46	
12	"	30 100	1,242 47½	
13	"	33 50	752 37½	
14	"	34 50	752 37½	
15	"	35 80	951 46	
16	"	40 100	1,242 47½	
17	"	42 50	752 37½	
18	"	42 50	752 37½	
			<u>\$15,941 32</u>	Total cost of weirs.

ROAD BRIDGES.

No.	Location.	Cost.	Remarks.
1	Sec. No. 6	\$1,315	{ Built with abutments of rusticated masonry.
2	" 10	1,315	
3	" 14	1,315	
4	" 17	1,315	At Sharon.
5	" 20	1,315	At Sharp's mill.
6	" 26	1,315	At Clarksville.
7	" 36	1,315	
8	" 43	1,315	At Greenville.
9	" 44	1,315	
10	" 45	1,315	

\$13,150 00 Total cost of road bridges.

CULVERTS.

No.	Description.	Size.	Cost.	Remarks.
1	Of wood.	2 feet square.	\$ 257 40	
2	"	"	257 40	
3	"	"	257 40	
4	"	"	257 40	
5	"	"	257 40	
6	"	"	257 40	
7	"	"	257 40	
8	Stone.	3 feet radius.	196 25	
9	"	"	196 25	
10	"	"	196 25	
11	Wood.	2 feet square.	257 40	

\$2,647 95 Total cost of culverts.

FARM BRIDGES, LOCK HOUSES AND FENCES.

46 Farm bridges,	at \$810 00 each,	\$37,260 00
24 Lock houses,	600 00 "	14,400 00
6400 Perches fence,	at 50 cents per perch,	3,200 00

SUMMARY.

Sections,	\$333,380 99
Locks,	263,423 51
Dams,	49,735 94 $\frac{1}{2}$
Aqueducts,	21,294 21 $\frac{1}{2}$
Towing path bridges,	7,323 14
Waste weirs,	15,941 32

Road bridges,	13,150
Culverts,	2,647 95
Farm bridges,	37,260
Lock houses,	14,400
Fence,	3,200

\$761,757 07

Add 10 per cent. for superintendence & contingencies. 76,175 70

Total cost, \$837,932 77

Total lockage, 174½ feet,

Total length, 45½ miles,

Average cost per mile, \$18,416 10

Estimated cost of that part of the Erie extension, Pennsylvania canal, between the mouth of Crooked creek and station No. 1466, near Conneaut lake.

SECTIONS.

No.	Length in stations.	Cost.	REMARKS.
47	24	\$6,358 20	
48	24	5,150	
49	24	5,004 42	
50	24	6,208 24	
51	24	5,544 85	
52	24	4,456 57	
53	24	5,004 83	
54	24	7,544 40	
55	24	11,213 69	
56	24	13,017 65	
57	24	7,304 84	
58	24	7,619 45	
59	24	7,598 05	
60	24	8,685 30	
61	18	34,593 90	
		<u>\$135,304 39</u>	Total cost of sections.

LOCKS.

No.	Location.	Lift.	Guard.	Cost.	REMARKS.
27		7 feet	none	\$9,850 00	
28		7	"	9,850	
29		7	"	9,937 20	
30		7	"	9,910	
31		6 $\frac{1}{2}$	"	8,842 50	
32		6 $\frac{1}{2}$	"	8,862 50	
33		6 $\frac{1}{2}$	"	8,862 50	
34		6 $\frac{1}{2}$	"	8,800	
35			6 feet	9,400	
36		6 $\frac{1}{2}$	none	9,447 20	
37		6 $\frac{1}{2}$	"	9,247 50	
38		6 $\frac{1}{2}$	"	9,247 50	
39		6 $\frac{1}{2}$	"	9,247 50	
40		6	"	8,995	
41		6	"	8,995	
42		6	"	9,484 50	
43		6	"	9,484 50	
44		6	3 feet	12,995	

110 feet\$171,458 40

Total cost of locks.

WASTE WEIRS.

No.	Location.	Length.	Cost.	Remarks.
19	Sec. No. 47	50 feet.	\$ 752 37 $\frac{1}{2}$	
20	"	51 50	752 37 $\frac{1}{2}$	
21	"	53 50	752 37 $\frac{1}{2}$	
22	"	53 50	752 37 $\frac{1}{2}$	
23	"	54 100	1,242 47 $\frac{1}{2}$	
24	"	60 100	1,242 47 $\frac{1}{2}$	

\$5,494 45 Total cost of weirs.

ROAD BRIDGES.

No.	Location.	Cost.	REMARKS.
11	Sec. No. 47	\$1,315	
12	" 51	1,315	
13	" 54	1,315	
14	" 57	1,315	
15	" 60	1,315	
16	" 61	1,315	

\$7,890 00 Total cost of road bridges.

FARM BRIDGES, LOCK HOUSES AND FENCES.

14 Farm bridges,	at \$810 each,	\$11,340
16 Lock houses,	600 "	9,600
3600 Perches,	at 50 cents,	1,800

CROOKED CREEK FEEDER AND FEEDER DAM.

Feeder 3,024 feet long, 10 feet wide on bottom,	\$2,153 11
Feeder dam 80 feet long and 5 feet high,	1,998 45
	<hr/>
	\$4,151 66

SUMMARY.

Sections,	\$135,304 39
Locks,	171,458 40
Waste weirs,	5,494 45
Road bridges,	7,890 00
Farm bridges,	11,340 00
Lock houses,	9,600 00
Fence,	1,800 00
Crooked creek feeder and dam,	4,151 66
	<hr/>
	\$347,038 90
Add for superintendence and contingencies, 10 per cent.,	34,703 00
	<hr/>
Total cost,	\$381,742 79
	<hr/>
Total distance,	14½
Total lockage,	110 feet.
Average cost per mile,	\$26,327 08 nearly.

Summary of whole line to near Conneaut Lake.

61 Sections,	\$468,685 38
44 Locks,	434,881 91
5 Dams,	49,735 94½
3 Aqueducts,	21,294 21½
9 Towing path bridges,	7,323 14
24 Waste weirs,	21,435 77
11 Culverts,	2,647 95
16 Road bridges,	21,040 00
60 Farm bridges,	4,860 00
40 Lock houses,	24,000 00
10,000 Perches fence,	5,000 00
Crooked creek feeder and feeder dam,	4,151 66
	<hr/>
	\$1,108,795 97

Add superintendence and contingencies, 10 per cent., 110,879 59

Total cost, \$1,219,675 56

Whole distance, 60 miles.

Whole lockage, 284½

Average cost per mile, \$20,327 92

No. 14.

Report of Charles T. Whippo, Principal Engineer upon the Routes from Conneaut Lake to the Harbor of Erie.

Hon. Board of Canal Commissioners of Pennsylvania.

GENTLEMEN—In compliance with a request communicated to me by the board last summer, I have had a survey made of the two contemplated canal routes between Conneaut Lake and the Harbour at Erie, and herewith submit to you my report. The survey was made under the immediate direction of Mr. T. J. Power, who has had a good deal of experience as an engineer, and in whose ability and integrity, the utmost reliance may be reposed. I have spent as much of my time with him, as I could spare from other engagements, and am satisfied that he has selected the best ground which could be found for both routes.

The routes are designated Eastern and Western. They both commence at the same point, which is marked A on the map, and which is about two miles west of Conneaut lake, near what is called Beaver dam summit. The Eastern route takes a south easterly direction to Conneaut lake, at the termination of the French Creek Feeder, and following the feeder by way of Meadville, and Bemus' mill, it winds up French Creek, crossing at Cambridge and passes over the summit northeast of Waterford, into the upper end of the valley of Walnut Creek. Winding out of this in a short distance, it enters the valley of Miller's Creek, down which it descends to McNair's brewery, and terminates at the mouth of the Navy Yard run, in the town of Erie, and is seventy-one miles in length.

The Western route takes a northerly direction over what is called the Conneaut summit, into the valley of Conneaut Creek, down which it passes twenty miles; and taking a north easterly direction to the head of Hall's run, it crosses Elk creek, passess through the town of Girard, and varying but little from the lines as run by Messrs.

Douglass and Vincent, several years ago, terminates also at the north of Navy Yard run in the town of Erie. This route is forty-five and five-eighths miles long. In making this report I do not intend to detain the board with tedious descriptions of the ground over which we have to pass in the location of these routes; but shall content myself, with briefly laying before them such facts as seem to have the strongest bearing on the decision, which they are about to make.

I have had both routes accurately laid down upon one sheet of paper, and upon a scale so small, that they both can be examined together. I have also given a summary statement of all the work, showing the number and length of sections, including the Waterford summit feeder, the canal from the point A on the map, to outlet of Conneaut lake, and the French Creek Feeder; the number of locks and the amount of lockage, the number of dams, the number of aqueducts, the number of culverts, the number of waste weirs, the number of bridges, the number of lock houses, and the amount of fence, together with the aggregate cost of each of the several kinds of work respectively. These statements will also be appended to the estimates.

A general profile of each route is also laid down upon a separate sheet, shewing the amount of lockage, the number of locks, with their respective lifts; also separate profiles of each of the summits, shewing the cuttings upon each, with their respective lengths. All these can be examined at a single glance upon the maps.

The estimates attached to this report, are made out more in detail than the summary estimates just referred to, and to them I would respectfully refer the board, should they wish to be informed, more fully, as to the manner in which we have come at our results.

One of the most serious difficulties in regard to these routes, has been as to the quantity of water for the supply of the summit levels. The streams which are principally depended on for the supply of the Eastern summit, viz: French creek and Miles' branch, which have frequently been engaged, and the quantities reported by different engineers. But as these results differ considerably from each other, and as the board may not have noticed them particularly, it will not perhaps be amiss to give them a place here. They are as follows: That reported by Major Douglass, is fifty-nine and a half cubic feet per second; and that by Mr. Livermore, one hundred cubic feet per second. My first guaging at this place was done in the summer of 1827, during one of the severest and most protracted droughts which was ever known in that part of the country; and the maximum result was a little more than forty-two cubic feet, per second. The operation was repeated three times, with all the care and accuracy of which I was capable, and with scarcely any variation. My second guaging was done last August, during a very low stage of water, but with a very different result from that of the first. I adopted two plans—one by sending down superficial floats, and finding the mean velocity by Robinson's formula, and the other by sending down submerged floats and taking their velocity as the mean velocity. By the first method, there

was sixty-five cubic feet per second, and by the second method, seventy cubic feet per second.

The board will perceive that the greatest difference in these results, is that between mine and Livermore's. This amounts to fifty-eight cubic feet. The least difference is between my minimum result last summer, and the result of Major Douglass, which amounts only to five and a half cubic feet. Between my first and second results, there is considerably more difference, it being twenty-eight cubic feet in one instance, and twenty-three in the other. A part of this difference in my case, arises from the different plans adopted in finding the mean velocities, but how the others could have originated I cannot pretend to account at least upon scientific principles. In 1827 when the result of my guaging, turned out to be so unexpectedly small, it was suggested to me that the dams above had been closed, and thus prevented the usual quantity of water coming down. If this was the case it is not unlikely, that during some of the other guagings, these dams may have been opened and a larger quantity than usual sent down. However this may be, it does at least appear extraordinary, that there should have been 100 cubic feet at this place, when at the same time there was but one hundred and thirty-eight feet at Bemus' mill. My own opinion is, that the difference at the two places would be much greater, and that it would at no time during the dry part of the season be less than as two to one, for it will be recollected, that above Bemus', there are Woodcock, Gravel run, Boles' run, Conneaut, Muddy and Le Beouff creeks, all of which are fine durable streams, and won't, I should think, produce at least three times the difference here represented.

The most embarrassing question now is, which of these very different results is the true one. I must confess for my own part, I am not prepared to answer, and I presume the board will find it equally difficult.

I am inclined to think, however, that, under all the circumstances, they will set down the quantity, as furnished by these streams, as somewhat greater than that reported by me in 1827.

I will remark at this place, that the amount of business, with a given quantity of water, which can be done with locks of low lifts, is greater than can be done with those of high lifts; and as I was of the opinion that the quantity here would not be, at any rate, altogether as great as would be desirable, I directed Mr. Power to make the lifts low. He accordingly made them six feet, and increased them on each side of the summit, as other supplies of water could be taken in. The reason why low lifts have an advantage over high ones, arises from the fact, that the quantity of water necessary in the one, is to that of the other, directly as their lifts; and consequently the amount of business which can be done with each kind, inversely as their lifts. For instance, to pass a boat up a flight of locks, with lifts of six feet, requires only eight thousand one hundred cubic feet of water; while with those of ten feet lifts, thirteen thousand five hundred cubic feet would be required; so that if a boat could pass through a six feet lift,

with a given quantity of water, in six minutes, it would require ten minutes with a lock of ten feet lift. There would be a greater number of locks it is true, but this disadvantage would not, by any means, be as great as that arising from the use of locks of high lifts.

This will be seen from the following calculation :

The length of line to be fed from the summit, exclusive of the feeder, (which is seven miles long, and which I set down as so much canal,) is twenty miles, viz; from the dam near Esq. Weston's, to near Miller's mill, on Miller's creek. From this point Mr. Power thinks that Miller's creek and its tributaries, will be sufficient to feed the residue of the distance to Erie. We therefore have twenty-seven miles in the whole.

Now, making an allowance of fifty cubic feet of water per minute for each mile of canal, for evaporation and filtration, and it will take for this line thirteen hundred and fifty cubic feet: and taking the quantity as found by me in 1827, viz: forty-two cubic feet per second, or two thousand five hundred and twenty cubic feet per minute, and we shall have left eleven hundred and seventy cubic feet per minute; to which if we add the quantity, which will be furnished by the Le Beouff creek, say one hundred and fifty cubic feet per minute, and we shall have left, one thousand three hundred and twenty cubic feet per minute for the lockage. This quantity, with locks of six feet lift, would pass a boat through a lock in six and one eighth minutes; or it would pass one over the summit every twelve and a quarter minutes; or a hundred and seventeen and a half, over the summit, in twenty-four hours. Whereas, with locks of ten feet lift, with the same quantity of water, only about seventy boats could pass the summit in twenty-four hours, or forty-seven and a half less than with those of six feet lift.

With seventy cubic feet of water per second, (the maximum result of my gauging this summer,) or rather I should say seventy-two and a half cubic feet, including the Le Beouff, we could pass a boat through a lock every two and seven-tenth minutes, or two hundred and sixty-six and a half, in twenty-four hours, besides supplying the requisite quantity for leakage and evaporation, at fifty cubic feet per minute for each mile. I must however express my doubt as to fifty cubic feet per minute being a sufficient allowance for evaporation and filtration. Much, it is true, depends upon the soil. Upon a part of this distance it is very tight; and the situation is favorable upon the whole of it; inasmuch as the ground descends towards the canal on both sides of it. Where the canal is upon sideling ground, the water which escapes by leakage never returns; but here it cannot escape, except by a subterranean passage. If, however, the quantity which I found this summer be the true one, or if the medium between the different gaugings be taken, a much greater allowance for evaporation and filtration may safely be made, and still have enough for a very extensive business. Upon the whole, I believe I may safely say, that the quantity of water upon this summit, will be sufficient. Should it ever get down as low as it appeared to be in 1827, and should the

leakage and evaporation turn out to be seventy-five cubic feet per minute for each mile, instead of fifty, still, with locks of small lifts, and by making reservoirs in the valleys of Walnut and Miller's creek, which can be done to a considerable extent, as much water could be obtained as would be sufficient for an active business, and as much, in all probability, as would ever be necessary for the business which would require to be done upon this line of canal.

Another formidable difficulty which presents itself upon the routes, is the deep cutting which has to be encountered in passing over their summits.

In running across the eastern summit, near Waterford, Mr. Power took such a level as to give him twenty-three feet cutting in the deepest place. The object of this was to decrease the lockage; and for this purpose I considered it good policy, though it subjected us to greater expense. The level which I run in 1827, was seven feet higher; and I should probably have taken the same at this time, had it not been suggested to me, that a lower one might be better, not only for the reason above given, but because it would enable us to obtain a greater supply of water. Both of these reasons appeared to me to have considerable force, and I was governed by them. Still, however, I would have had another level run, had there been sufficient time to do it; but there was not; for the season was already far advanced, and the weather very unsuitable for field operations before we effected what we did, notwithstanding the utmost exertions we could make. My opinion is, that should the eastern route be adopted, the new summit would be preferred; in which event, a higher level may very probably be most economical, by lessening the depth of cutting, and the amount of excavation.

After the line over the eastern summit was run, I employed Col. Shryock, of Meadville, to sink shafts at several places upon it, with a view of ascertaining the nature of the material, of which it was composed. This service, he performed faithfully; and also finding it very difficult to sink shafts, procured an auger, and bored down in a number of other places, where he could not sink shafts, as low as desirable. He reports upon six places, where he either sunk shafts, or bored. These places were at the stations as marked off by the engineers, and which are three chains apart. His report is as follows:

At station, No. 914, 3 feet of clay, 2 feet quick sand, 4 feet fine gravel and clay, $5\frac{1}{2}$ feet quick sand.

" 915, 3 feet of clay, $3\frac{1}{2}$ feet of gravel, $9\frac{1}{2}$ feet quick sand.

" 917, $5\frac{1}{2}$ feet of clay and gravel, 9 feet 4 inches blue clay.

" 918, $4\frac{1}{2}$ feet of clay and gravel, 9 feet 4 inches quick sand, 9 feet 2 inches blue clay.

" 923, 5 feet of yellow clay, 5 feet blue gravel, 7 feet sharp blue sand.

" 924, 17 feet blue clay, 2 feet 4 inches gravel and sand.

I visited one of the shafts which had been sunk, at the deepest place

in the summit. The upper stratum of earth, for four or four and a half feet in depth, was a mixture of clay and gravel; and immediately below, there was seven feet of blue quick sand. This material, has long been considered, as presenting one of the most formidable difficulties to be met with in canaling, and it has therefore been desirable, in all cases, if possible to avoid it. At the time Mr. Power examined the summit, not anticipating any other difficulty, than that of deep cutting, directed his attention only to finding the lowest point. In this he succeeded. But after the examination of Col. Shryock, another summit was found, a little west of the first; which though twenty-one feet higher, is nevertheless on account of the material, much the most favourable location for the canal. This summit was discovered by Col. Henry Colt, of Waterford, who has besides, had one or two shafts sunk upon it, and had it perforated in a number of places, with an auger, for the purpose of ascertaining the kind of material, of which it is composed. This, so far as the shaft could be sunk, was a solid clay and gravel; below which the material appeared to be rock, either solid or detached: so hard at any rate, that the auger would not penetrate it. Col. Colt informs me, that this kind of material prevailed at every place, where an examination was made. Now by taking a higher level, say about the same as that I adopted in 1827, this summit might be passed, with about the same cutting we have upon the other; and with about the same amount of excavation and cost. The difference of lockage however, and two additional lockhouses, must be added; and also, (Mr. Power thinks,) about \$17,000 for the increased expense of the feeder, and a part of the canal, south of and adjoining the summit. But the whole would not probably exceed \$35,000. The other route, though estimated at from forty to fifty-five cents per cubic yard, cannot be done for any thing like that sum of money; indeed it is impossible to say what it would cost, The only chance in passing such a vein of quicksand, in my opinion is, to exhaust it, and the expense, of course, must be as uncertain, and as far beyond our reach, as the hidden extent of the vein; and as little to be estimated as the quantity which it contains.

The summit level on the Western route, should that be adopted, must be supplied with water from French creek, through the French creek feeder; and if necessary by means of a reservoir at Conneaut lake. The quantity, which this stream will furnish, according to the report of Maj. Douglass, is one hundred and fifty-eight nine-tenths cubic feet per second; but by a subsequent measurement, made by Mr. Livermore, it is only one hundred and thirty-eight. At the time I gauged the streams above, for the supply of the Eastern summit, I was desirous of gauging this also; but as our letting for the lower line, was close at hand, and as my presence was indispensably necessary, in order to make some arrangements in reference to that event, I could not attend to it at that time; and before I was able to return, the streams had become so raised, by intervening rains, that no satisfactory result could be obtained. I cannot therefore, pretend to give any opinion, as to which of these results is most to be relied on. They

may very probably be both correct, and the difference arises in consequence of the stream being lower, at one time, than at the other. In my calculations however, wishing to be upon the safe side, I shall depend upon the smallest quantity. Taking this as the basis of my calculation, we will see how far it will go, towards furnishing the necessary supply. In the first place, supposing the French creek feeder to require for evaporation and filtration, as much water, as so much canal; say seventy-five cubic feet per minute for each mile; then as this feeder is twenty-two and a half miles long, this demand will be equal to sixteen hundred and eighty-seven and a half cubic feet per minute. The lockage also, below the aqueduct, towards Franklin, has also to be supplied. I take it for granted, that in as much as all the leakage from the feeder must pass into French creek again, and also as there are a number of streams coming in below the feeder dam at Bemus' mill, no water will require to be drawn from the feeder, for the Franklin line, except what may be necessary, for the lockage just alluded to. How much this will amount to, I cannot pretend to say. At present, and probably for many years to come, it will be exceedingly small. If however a rail road should be constructed, as is now in contemplation, to come in from the east, and terminate at or near Franklin, a considerable amount of business may be done upon this canal. I will suppose, that by this, or some other means, of which we have not as yet become acquainted, there will be, say fifty boats pass every twenty-four hours; that is twenty-five up and twenty-five down. Then as the locks are ten feet lift by eighteen feet wide, and ninety feet long, each lock will contain sixteen thousand two hundred cubic feet, which being multiplied by fifty gives eight hundred and ten thousand cubic feet for every twenty-four hours, or five hundred and sixty-two five-tenths cubic feet per minute; thus leaving only six thousand and thirty cubic feet per minute, to pass into Conneaut lake. This quantity, with locks of six feet lift, will be sufficient to pass one hundred boats over the summit, or one hundred each way from the summit, every twenty-four hours, amounting to two hundred locks full of water; and also, supply sixty-five four-tenths miles of canal, with the requisite quantity, for evaporation and filtration, at the rate of seventy-five cubic feet per minute, for each mile of canal.

But the canal which has to depend for a supply of water upon this summit and other sources, is only fifty and five-eighth miles in length, viz: from the point A near the Beaver dam summit, to the head of the Pymatuning reservoir, five miles; and from the same point, to the harbor of Erie, forty-five and five-eighth miles. The Pymatuning reservoir, you will perceive by my report, in regard to the lower line, will contain upwards of four hundred acres, and is intended in conjunction with Crooked creek, to feed down as far as the little Shenango; and I have no doubt that they will be abundantly sufficient for that purpose. The supply which can thus be obtained on the summit, is not all which may be depended upon for this canal. There are a number of durable streams which will be taken in, as we pass down from Conneaut summit on our way to Erie. These, Mr. Power informs me, from

observations and enquiries which he made, will, in the aggregate, furnish at least twenty-seven cubic feet per second. This will be equal to the evaporation and filtration on twenty-two miles of canal. A part of this water, it is true, will be taken from big Conneaut creek, and this it may be said, will be objected to by the state of Ohio, into which the stream passes. In answer to this, I will remark, that the canal passes along the valley of this stream, for the distance of twenty miles, and the water which will escape from it by leakage, and which will consequently find its way into this stream, will more than compensate for all that we take from it, and that, therefore, we need not be under any apprehension of incurring the displeasure of the people of Ohio. We certainly have a right to use the water in our own territory, in any way we please, and if we do not ultimately divert it from the channel or lessen the quantity which they receive, they cannot sustain an action against us. There is one more method of securing an additional supply upon this summit, which I will advert to; one, however, which I trust will not require to be resorted to. I merely mention it to show what can be done, should the necessity for it arise. My present plan is to raise Conneaut lake, eight feet, for the purpose of lessening the deep cutting to that amount on the summit level. But as this does not raise the surface of the lake above the level of the canal it is not of any service, as a reservoir. Suppose, however, the embankment at the outlet of the lake should be raised three feet higher than is now contemplated, and the banks of the feeder be raised correspondingly high. A reservoir would thus be created containing, say sixteen hundred acres, and with a depth of three feet, would contain 209,088,000 cubic feet of water, equal to fourteen hundred and fifty-two cubic feet per minute for one hundred days. This would be sufficient to pass one hundred boats per day over the summit during this period, and leave a surplus of three hundred and twenty-seven cubic feet per minute for the supply of the canal. It may be said in opposition to this plan, that a considerable portion of the water will escape by evaporation, this will undoubtedly be the case to a certain extent, but then it must be recollected, that there are several streams and a great number of springs, constantly running in to supply the deficiency.—Add to this the rain and dews, which never fail to descend in greater or less quantities, and I think the objection will have but little force. Should any other argument be required, it may be mentioned, that when I visited Conneaut lake in 1827, there was a considerable volume of water discharging at its outlet. The precise quantity I did not ascertain, but Major Douglass in his report of 1826, states it to be seven and one-third cubic feet per second. The evaporation then, was undoubtedly as great in proportion to the extent of the surface, as it will be when the lake is raised, but I do not think it will ever be greater than the supply brought in from the sources above alluded to. Upon the whole, I think I run no risk in saying, that upon this as well as the Eastern route there will be a sufficient supply of water for an active business; not quite equal perhaps to the maximum use of the locks,

but fully equal to the wants of the country, and I presume I may add equal to that of any canal in the Union.

It will perhaps be asked, will not the overflowing of the low and swampy ground along the shores of the Conneaut lake, be very likely to produce sickness? My answer is, that judging from what I have seen in other and similar cases, I should think it would. It is, however, well known by all who live in that country, that although much land is overflowed every spring not only here, but particularly in the Pymatuning swamp, still very little if any sickness results from it. This is undoubtedly a singular fact, but it is nevertheless true; it is the intention in case the western route should be adopted, to have all the timber cleared off as far back as the water will flow. The cost of this I have set down at twenty dollars per acre, and the number of acres I obtained from a manuscript report of James Ferguson, Esq. engineer of the French Creek feeder, who had ascertained the quantity by actual admeasurement.

In another part of this report, I alluded to the difficulty upon these routes arising from the deep cutting upon their summits. That at Conneaut is twenty-one feet, at its deepest place, and slopes off on the southern side of it to common cutting, in the distance of one hundred and eighty chains. On the other side its descent is more rapid, and the level runs out to common cutting in thirty chains. Col. Shyock was also employed upon this summit for the purpose of boring, and ascertaining the nature of the soil. His report is as follows at the different stations where he bored:

- Station, No. 60. Seven feet nine inches yellow clay, two feet seven inches blue clay, sixteen feet eight inches gravel, two feet blue clay.
- “ 59. Summit, three and a half feet clay, seven and a half feet gravel, this was all we were able to go without sparing too much time.
- “ 57. Four feet yellow clay, seven feet gravel.
- “ 55. Three feet clay, fourteen and a half gravel, eleven and a half blue clay.
- “ 52. Nine feet nine inches blue clay, five feet nine inches gravel, twelve feet blue clay.
- “ 51. Eight and a half feet black muck, one foot blue clay, five and a half feet gravel and sand thirteen and a half feet blue clay.
- “ 49. Seven feet seven inches muck and blue clay, eighteen inches gravel, twenty feet seven inches blue clay.
- “ 47. Five feet four inches blue clay, two feet gravel, twenty feet two inches sharp sand, at this station we were only able to bore seventeen feet, the sand filling the hole, so that we had much difficulty to draw the auger, we perforated the last ten feet.
- “ 45 The same as at station No. 47, sharp sand; I do

not think it is quicksand, but is owing to the great quantity of water coming into the hole, which is the cause of its filling.

- Station, No. 43. Four feet yellow clay, four feet blue clay, four feet gravel, twelve feet blue clay,
 " 41. One foot muck, twenty-two feet blue clay.
 " 37. Nine feet blue clay, four feet of sand, ten feet blue clay.
 " 30. One foot sand, two feet yellow clay, eight feet blue clay, three feet sand, four feet blue clay.

These examinations extend generally, eight feet lower than was necessary, owing to an opinion which I at first ascertained, that it might be proper to carry the level at this depth. I have, however, since altered my plan, and concluded to raise the level eight feet for the purpose, as I remarked before, of lessening the cutting to this amount upon the summit. I therefore subjoin the following table, which shows the kind of material and depths upon the summit, according to Col. Shyock's report, after deducting eight feet from the cuttings as above alluded to.

Station No	Cutting	Yellow clay	Blue clay	Gravel	Gravel and sand	Black muck	River sand
30	13.50	2.00	8.00				3.50
37	17.50		13.00				4.50
41	18.00		17.00			1.00	
43	16.00	4.00	8.00	4.00			
45	18.50		5.50	2.00			11.00
47	16.50		5.40	2.00			9.00
49	17.00		15.50	1.50			
51	18.00		4.00		5.50	8.50	
52	19.50	9.75	4.00	5.75			
55	21.00	3.00	3.50	14.50			
57	21.00	4.00		7.00			
59	21.00	3.50		7.50	Could get no lower.		
60	21.50	7.75	2.50	11.25			

It seems from this, that upon this summit we have no quick sand to encounter; but we have some blue clay, which is also a bad material to excavate. There is this difference, however, between it and quicksand: the one will only slip in when left at too steep a slope, and particularly when the stratum is deep and extensive; whereas the other, like water, will find its level, and will continue to rise up as long as there is any of it left, above the level to which the excavation extends.

Fortunately, however, there is but little blue Clay upon this summit; and what there is lies in such detached masses, and is so connected with the gravel, that I anticipate but little difficulty from it.

We have, also, two other very difficult points to encounter, in crossing Elk and Walnut creeks. These streams run in deep ravines,

from seventy-four to near a hundred feet below our level. I propose crossing these by means of culverts and embankments; but, though this is undoubtedly the cheapest plan, the board will perceive, that the expense is, nevertheless, very great. With these two exceptions, and a deep cut at Girard, and a piece of steep sideling ground before we get to that place, the line is uncommonly favorable for the construction of a canal.

In making my estimate for locks, I have gone upon the supposition that suitable stone would be found for cutting; but should we be disappointed in this, we shall be under the necessity of making our locks of wood and stone combined; the material for which will be abundant and generally convenient. Such locks, however, if made well, and grouted with hydraulic cement, will cost as much as we have estimated the other kind at. The other estimates, though apparently high, will be found, upon comparing them with the high prices of labor and all kinds of provisions and materials, as low as the work can well be done for. Indeed, if I were to alter them at all, I would increase, rather than lessen them.

All of which is respectfully submitted.

CHARLES T. WHIPPO,

Principal Engineer.

ENGINEER'S OFFICE NEW CASTLE, }
November 22, 1836.

NORTH BRANCH EXTENSION.

No 17.

Report of James D. Harris, Principal Engineer.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN—Conformably to my appointment as engineer of the North Branch division of the Pennsylvania canal, with which your board has been pleased to honor me. I have completed the surveys preparatory to the location of a portion of said division, “commencing at or near the New York state line,” and have the honor to lay before you a map and estimates of the same, and to report as follows.

Previous to commencing the surveys, a cursory examination of the valley of the river was had from the finished canal at Lackawanna creek to the state line, resulting in the conviction that a survey of the whole ground between those points, would be necessary to arrive at

correct conclusions in regard to the location. The surveys were accordingly begun at the line, and a careful examination made, both of the valleys of the Chemung and of the Susquehanna, from the state line to their junction at Athens. The Chemung valley was explored as high as the third crossing of the state line, with a view to ascertain the practicability of constructing a canal wholly within the limits of the state of Pennsylvania, from that place downwards. From others the surveys were continued on both sides of the Susquehanna to the Wyoming canal at Lackawanna creek.

After a review of the country between Tioga Point and the state line, performed with a considerable degree of care, the opinion has been formed that the canal should be planned, with a view to a continuation up both branches of the river, forming a junction both with the Shenango and Chemung canals in the state of New York. The importance of both those connections is so obvious that it may be fairly presumed that their construction by the state of New York, will not be long delayed. Whether the east or west side of the river is pursued therefore from Athens downwards, a dam will be necessary at that village, to serve the double purpose of supplying the canal with water, and for the transit of boats; and in order that nothing may be done which will prevent the most convenient connection with the New York improvements, and such as would be most satisfactory to the canal commissioners of the two states, is believed to be inexpedient to push the improvements of this state above Athens, until an understanding is had with the authorities of New York, in relation to a connection with their works. Whether or not any legislative action is necessary for the attainment of this object, I leave for the determination of the board.

With these impressions the estimates on both sides of the Susquehanna, have been commenced at Athens, and are predicated on the supposition that a dam will be erected there. The dam adapted to the line on the east side of the Susquehanna, is proposed to be built opposite to Mr. Satterlee's. The site is three miles and sixty chains from the crossing of the state line on the Susquehanna, and four miles and forty chains from the first crossing of the state line on the Chemung. The dam would be nine and sixty-eight hundredth feet in height above the surface of low water. From this dam the canal would be fed for a distance of twenty-two miles and twenty-eight chains, ending at the head of the island at Kellum's, passing Wysox creek by an aqueduct. At Kellum's a second dam may be erected of the height of six and thirty hundredth feet above the surface of low water, in the pool of which a part of the narrows below Wysox, (seventy-two chains) would be passed along a towing path. From the dam at Kellums, the canal would be fed to the Horse Race rifts, a distance of thirty-four miles and fifty-eight chains, passing Wyalusing, Tuscarora and Meshoppen creeks by aqueducts. At the head of the rifts at the Horse Race, a third dam five feet in height above low water is proposed to be erected for the supply of the canal with water, thence to the Wyoming canal at Lackawanna, a distance of thirty-two miles

and forty-seven chains. It would form slackwater from near Meshoppen creek to the dam, a distance of two miles and seventy-four chains. The portion of the line to be fed by this dam, passes Tunkhannock, Buttermilk, Gardner's and Lackawanna creeks by aqueducts. The whole distance from the dam at Athens to the Wyoming canal, is eighty-nine miles and fifty-three chains, of which three miles and sixty-six chains will be slackwater. Estimate of cost, \$2,960,578 12. Whole lockage 193.34 feet. The whole length of narrows requiring protection wall on this line, is thirty-four miles and fifty chains.

The dam proposed to be built on the Chemung suited to a canal on the west side of the Susquehanna, may be erected near the head of the village of Athens, a point convenient for passing the trade of the upper Susquehanna valley, as well as for feeding the canal with water. It would be nine and twenty-three hundredth feet in height above the surface of low water. The distance from this site to the crossing of the state line on the Susquehanna, is four miles and thirty-four chains, and to the first crossing of the state line on the Chemung, is four miles and twenty-two chains. This dam would afford a good depth of water for boats past the rocky narrows above Athens, to M'Duffie's mill, one and a half miles. By it the canal may be fed to a second dam at Kellum's, distance twenty-one miles and fifty-six chains, passing Sugar creek by an aqueduct, and Towanda creek by a dam. The dam at Kellum's would be 6.30 feet in height above low water, and would feed the canal thence to the Horse race; distance thirty-six miles and thirty-six chains, passing Bennett's and Durell's creeks by dams, and Little Sugar creek by an aqueduct. A third dam five feet in height may be built at the horse race, by which the canal could be fed thence to its junction with the Wyoming canal, near Lackawanna creek; distance thirty-two miles and seventeen and three quarter chains, passing Bowman's, Swartout's and Suttons' creeks, and the Susquehanna river at the mouth of Lackawanna by aqueducts. It will create a pool past Big and Little Mehoopeny creeks, forming slack water for a distance of one mile and thirty-two chains. The whole distance from the dam at Athens to the Wyoming canal by this line is ninety miles and twenty-nine and three quarter chains, of which one mile and thirty-four chains are slackwater. Estimate of cost, \$3,451,523 90. Whole lockage 188 feet. The whole length of narrows requiring protection wall is forty miles.

The line on the west side of the river, meets the Wyoming canal at a point fifty four chains lower down the river, than the line on the east side. The fall from the state line, on the Susquehanna, to the surface of the pool of the dam at Satterlee's, would be three feet; and from the crossing of the state line on the Chemung, to the surface of the proposed pool on the Chemung, at Athens, would be nine feet. The surface on the pool on the Chemung, would be two and eighty-eight hundredth feet lower, than the pool on the Susquehanna; so that there could be no encroachment on the territory of New York, by erecting the dam at either of the sites.

With regard to the supply of water for a canal, some doubts have

been expressed by inhabitants of the country whether, or not, the quantity which would be furnished by the Chemung, would be adequate, at dry seasons, to supply the canal from Athens, to the second dam. Be this as it may, the Susquehanna may be considered as amply sufficient for this purpose, and the dam on the Chemung, is planned on such level, that the water may be introduced into its pool, from a dam on the Susquehanna; so located that the water will *barely* set back to the state line. An estimate has been made of the cost of a dam and feeder for this purpose, which amounts to \$91,037 00; the items of which will be found in estimates in detail. The feeder would be two miles, and twenty chains long, and the dam 5.52 feet in height above low water; and placed a short distance below Cayuta creek. It is not deemed necessary to erect this dam at present, *merely* for the purpose of feeding the canal. A more economical arrangement can probably be made for effecting the same object, in connection with the extension of the canal up the valley of the Susquehanna, on negotiation with the canal agents of New York.

The foregoing estimates of the cost of a canal from Athens, to Lackawanna, have been made on the hypothesis, that the improvement would be constructed wholly, either on the east, or west side of the river, between those places. Proceeding upon this supposition, sites for dams were selected, with a view to have them at such intervals as would admit of a full supply of water for the canal, and at such points as would favour the security of the canal, below the dams. The sites chosen for the second and third dams, are common to the lines on both sides of the river. The fall in the river for four miles below those sites, is greater than for any equal distance between Athens, and Lackawanna.

In the progress of the surveys, two sites have presented themselves as favorable for crossing from the west, to the east side of the river, between the state line, and Lackawanna creek: one of which is at the dam proposed at Kellum's, the other at the village of Towanda. Estimates have been made of both those plans, which are herewith submitted. The estimated cost of the former is \$3,032,048 52. Length eighty-nine miles and twelve chains, of which three miles, and sixty-six chains, are slackwater. The whole length of narrows requiring protection wall on this line, is thirty-five miles and twenty chains; lockage one hundred and eighty-eight feet. The estimated cost of the line, crossing at Towanda, is \$2,923,294 99. Length eighty-nine miles and fourteen chains. The whole length of the narrows requiring protection wall on this line, is thirty-four miles, and seventy chains; lockage one hundred and eighty-eight feet. The greatest distance to be fed between the dams, would be from Towanda, to the Horse Race, forty miles and sixty-four chains. The dam for crossing at Kellum's, would be 6.30 feet high above low water. The dam at Towanda, will be 12.46 feet high above low water. A dam of this height is required here, that the level may be carried sufficiently high to pass Wysox creek above freshets. The river being confined by hills and high banks on both sides, for two miles above the site of the

dam, except a narrow flat immediately above the site, renders it an eligible point for the erection of a high dam. By building it of the height proposed, it will place the canal at as safe a level, with reference to floods, as it would be at the sites at Kellum's, or the Horse Race; the dams at those places being of the height proposed in the respective estimates. At Wysox creek, four miles below the dam, the bottom of the canal will be as high as the freshets.

An extra guard lock has been estimated, near to each of the dams, which is designed to be placed at a proper distance below the dam, and to be used at times of extraordinary freshets, as a regulating lock, to counteract the pressure of the water on the outer side of the banks, and as a lift lock, if necessary. A river lock has also been estimated at each of the dams, of sufficient capacity to pass the river craft.

In the foregoing estimates for the several lines, of which that part on the east side of the river from the Horse-Race to Lackawanna, would form a part, the amount of \$200,703 17, is included for five miles and eight chains, of canal around the neck; from station 735 to station 803. By the construction of a tunnel of fifty-seven chains = 3762 feet long, in connection with seventeen chains of canal, in all seventy-four chains, across the neck, there would be a saving in distance of four miles, and fourteen chains. The estimated cost of this work is \$198,348 40, exhibiting a saving, by adopting the tunnel of \$1,657 77. The details of the estimate of the tunnel will be found in the documents accompanying the report. Few tunnels if any, having been undertaken in this country of the length required, here it was considered proper to report the estimate for doubling the bend, and make the tunnel the subject of a supplementary estimate; which has been done. The tunnel recommends itself by its superior permanency, as well as by the important saving of distance. The west end of it would be one mile, and forty-six chains, east of the dam at the Horse-Race, so that by placing the extra guard lock at the west end of the tunnel, that part of the canal only from the dam to the tunnel, would be exposed to the river. The canal at the east end of the tunnel would be a safe height above floods. In the estimate of the tunnel 20,164 perches of arch are included, at eight dollars per perch; amounting to \$161,312; on the supposition that the tunnel may require arching throughout. It may be expected however that the rock is sufficiently firm to support itself generally, judging by the character of it as exposed in the face of the mountain. If this should be the fact two hundred feet lineal of the arching, at each end, will probably be sufficient, and the estimated cost of the tunnel and canal, (seventy four chains) will be \$62,118 40; exhibiting a saving in expense by adopting the tunnel, of \$137,887 77. Substituting the most favorable estimate for the tunnel, for that of the cost of a canal around the bend, the total estimated cost for the least expensive line, between Athens, and Lackawanna, (crossing at Towanda,) will be \$2,785,407 22 cents. Distance eighty-five miles. The highest ground over the bottom of the tunnel would be 358.64 feet. For the purpose of gaining a knowledge of the material of which the hill is composed, a shaft

could be sunk at the distance of five hundred and ninety-four feet from the east end, where the depth from the surface of the ground, to the bottom of the canal would be ninety feet; and at the other points if thought necessary.

In determining upon a line of improvement, the great end in view is to make such location as will afford the most facilities for the business which is to be done on it; having due regard to the permanency of the work and the cost of construction. The leading objects in the construction of the work under construction are: 1st. To form an easy channel of transportation between the coal mines of Wyoming valley, Mehoopeny and Towanda valleys, and the northern and western states and Canada, and with the eastern sea board. 2d. To give to the agricultural sections of the counties through which the canal will pass, facilities for reaching a market with these products. 3d. To foster and promote intercourse and trade between the central counties of Pennsylvania, and the interior of New York; particularly in the articles of iron, salt and gypsum. 4th. To encourage the transportation of the agricultural and other products of New York through the state of Pennsylvania, along her canals, and to her metropolis; and the purchase of merchandize at the same great mart; and its transportation by our canals to our northern border.—The considerations under the first and second heads, are those which must more immediately influence the location of the work.

A canal commencing at the dam proposed to be built on the Chemung, at Athens, and pursuing the west side of the river thence to Towanda, or Kellum's, and crossing at either of those points, and pursuing the east side thence to Lackawanna, embracing in its details a dam at the Horse Race, would, it is believed, accommodate the important interests enumerated. The coal of Mehoopeny valley would enter the pool of the dam at the Horse Race at the mouth of Big Mehoopeny creek, and the coal of the Towanda valley would meet the canal at the crossing of Towanda creek, or at Towanda village. The agricultural and other products of the upper part of Bradford county, would meet the canal at Athens, mouth of Sugar creek, Towanda village, and mouth of Wysox creek. Those of the lower part of Bradford, upper part of Luzerne and west part of Susquehanna county, coming, as they would, principally from the east side of the river, would meet the canal at Wyalusing, Tuscarora and Tunkhannock creeks. The pool at Mehoopeny, together with a contemplated bridge over the river on the Montrose turnpike, at Tunkhannock, when built, will accommodate the inhabitants on the west side of the river, below Mehoopeny, and up the valley of Bowman's creek.

If the foregoing position and deductions be correct, the question of location will be narrowed down to a selection from the two lines last designated; one of which crosses the river at Kellum's, and the other at Towanda village. The objections which may be urged against the latter, are the height of the dam, and the overflowing, and consequent destruction of that flat opposite Towanda. On the other

hand, it may be contended in favor of this line, that it is the least expensive; that it will accommodate, most effectually, the fixed capital at Towanda, and that the surplus water power of the dam will be more valuable here than at Kellum's, on account of its proximity to the village, and the greater accumulation of it; and further, that the mills of Hale & Patton at Towanda creek will be destroyed by adopting the former line.

With these remarks the decision of the location is respectfully submitted to the judgment of the board.

JAMES D. HARRIS,

Engineer North Branch Division, &c.

TOWANDA, August 26, 1836.

Estimate of Canal on west side of Susquehanna, from station 29, to Athens.

From station No. 29 below Cayuta creek, to station No. 58 on the Chemung river, 180 chains.

Grubbing,	30 chains,	\$6	\$ 180
Excavation, common,	121,373	8 cents,	9,709 84
Embankment,	36,318	12 "	4,358 16
1 Guard lock,			10,000
1 River lock,			20,000
1 Outlet and guard lock, connected,	288 feet,		6,000
Dam at station 29,			33,374
Protection wall,	6,415 perches,	\$1	6,415
2 Lock houses,			1,000
			<hr/>
			\$ 91,037

Estimate of canal on west side Susquehanna from the dam proposed on the Chemung river, at Athens to Lackawana creek.

From station 57 west side of the Chemung, to station No. 121 at head of Ulster narrows, 336 chains.

Grubbing,	74 chains	at \$6	\$444
Excavation, common,	123,219 cubic yards,	8 cents,	9,857 52
Embankment,	164,143		
Do	12,686		
<hr/>			
176,829		12 cents,	21,219 48
One guard lock No. 1 and one extra,		\$7000	17,000
One river lock,			20,000
Dam at Athens,			25,664
One lock house,			500
One public bridge,			600
Ten farm bridges,		\$500	5,000
Two culverts 8 feet and two of 6 feet,			2,512 10

One waste weir,
Moving Mineir's house,

600

100

\$103,497 10

2. From station No. 121 through Ulster's narrows, to station No. 148, 162, chains.

Grubbing,	120 chains,	at \$6	\$720
Excavation, common,	13,424 yards,	12 cents,	1,610 88
Embankment,	426,849 "	15	64,027 35
Protection wall,	38,961 perches,	80	31,168 80
Road,	40 chains,	\$4	160

\$97,687 03

3. Through flat from station No. 148 to station No. 193 near Overton's, 270 chains.

Grubbing,	60 chains,	at \$6	360
Excavation, common,	15,302	8 cents,	1,224 16
Embankment,	172,638	12	20,716 56
Lock No. 2, 8 feet, No. 3, 8 feet, 16 feet at	\$800		12,800
Seven farm bridges,		500	3,500
Two lock houses,		500	1,000
One culvert of three feet and one of six feet,			992 88
Two waste weirs,		600	1,200

\$41,793 60

4. Along Overton's narrows from station No. 193 to station No. 220, 162 chains.

Grubbing,	158 chains,	\$6	\$948
Excavation, common,	7,128 cubic yards,	12 cents,	855 36
Embankment,	318,839	25	79,709 75
Excavation, rock,	41,752	45	18,779 40
Protection wall,	37,518 perches,	50	18,759
One culvert,	6 feet		580 20
Road,	160 chains,	\$12	1,920

\$121,551 71

5. Through flats of Sugar creek from station No. 220 to station No. 235, 90 chains.

Grubbing,	78 chains,	\$6	\$468
Excavation, common,	5,234 cubic yards,	8	418 72
Embankment,	96,236	12	11,548 32
Aqueduct, Sugar creek,			11,561
Two farm bridges,		\$500	1,000

One culvert,	8 feet,	675	88
Moving Myers' house,		100	

\$25,771 92

6. Along narrows above Towanda village from station No. 235 to station No. 254. 114 chains.

Grubbing,	90 chains,	\$6	540
Excavation, common,	72,757 cubic yards,	12 cents,	8,730 84
Embankment,	38,423	15 "	5,763 45
Protection wall,	26,828 perches,	\$1	26,828

\$41,862 29

7. Through Towanda village along Water street from station No. 254 to station No. 264, 60 chains.

Excavation, common,	13,308 cubic yards,	8 cents,	1,064 64
Embankment,	14,454	12 "	1,734 48
Protection wall,	9,630 perches,	\$1	9,630
Two public bridges,		600	1,200
Removing buildings,			3,050

\$16,679 1

8. Through flat of Towanda creek from station No. 264 to station No. 291, 162 chains.

Grubbing,	18 chains,	\$6	108
Excavation, common,	27,831	8 cents,	2,226 48
Embankment,	60,788	12 "	7,294 50
Dam at Towanda creek,			5,968
Towpath bridge over same,			3,000
Lock No. 4 ten feet, No. 5 ten feet=20 feet,			16,000
Guard lock,			6,000
Four farm bridges,		\$500	2,000
Three lock houses,		500	1,500
Removing Goodrich's tannery,			300

\$44,397 04

9. Along narrows by Rocky rift from station No. 291 to station No. 321, 180 chains.

Grubbing,	174 chains,	\$6	1,044
Embankment,	226,874 yards,	25	56,718 50
Excavation, rock,	123,185	45	55,433 25
Protection wall,	41,311	50	20,655 50

\$133,851 25

10. Through flat below Cole's from station No. 321 to station No 346 at Kellum's, 150 chains.

Grubbing,	102 chains,	\$6	612
Excavation, common,	88,935	8 cents,	7,114 80
Embankment,	12,079	12	1,449 36
Two farm bridges,		\$ 500	1,000
One Waste weir,		600	600
Locks at outlet 25 feet, No. 6, 7 & 8,		800	20,000
One lock house,			500
One public bridge,			600

\$31,876 16

1. Along bluffs by Bennet's creek and Standing stone narrows from station No. 346 to station No. 416, 420 chains.

Grubbing,	354 chains,	\$6	2,124
Excavation, common,	384,316 cubic yards,	12 cents,	46,117 92
Embankment,	790,292	25	197,573
Excavation, rock,	150,311	45	67,639 95
Protection wall,	108,284 perches,	50	54,142
Dam at Kellum's,			44,854
Dam at Bennet's creek,			2,920
Dam at Durrell's creek,			6,400
Waste weir at Holden's creek,			600
Waste weir at Smith's creek,			600
One guard lock,			10,009
One river lock,			20,000
One lock house,			500
One public bridge,			600
Removing Smith's saw mill,			100
Removing Bennet's mills,			500
One guard lock at Laport's,			6,000

\$460,670 87

2. Through flat below Frenchtown from station No. 416 to station No. 456, 240 chains.

Grubbing,	40 chains,	\$6	240
Excavation, common,	102,692 cubic yards,	8 cents,	8,215
Six farm bridges,		\$ 500	3,000
One culvert four feet,			481 52
One waste weir,			1,600

\$12,536 88

3. Along Homits' narrows from station No. 456 to station No. 495, 234 chains.

Grubbing,	234 chains,	\$6	1,404
Excavation, rock,	118,441	45 cents,	53,298 45.
Embankment,	573,005	25	143,251 25
Protection wall,	60,044	50	30,022
Removing Homits' mills,			300
Renewing mill race,			700
One public bridge,			600
One lock four feet lift No. 9,			4,000
One lock house,			500
One waste weir,			600

\$234,675 70

4. Through flats opposite Terrytown from station No. 495 to station No. 525, 180 chains.

Grubbing,	10 chains,	\$6	\$60
Excavation, common,	58,679	8 cents,	4,694 32
Embankment,	12,576	12	1,509 12
Lock eight feet No. 10,		\$800	6,400
Lock house,			500
One culvert eight feet,			675 88
Six farm bridges,		\$500	3,000
One waste weir,			600

\$17,439 32

5. Along narrows below Terrytown from station No. 525 to station No. 537, 72 chains.

Grubbing,	60 chains,	\$6	360
Embankment,	200,018 cubic yards,	25 cents,	50,004 50
Excavation, rock,	73,863	45	33,238 35
Protection wall,	15,491 perches,	50	7,745 50
One culvert six feet,			580 20
Road,	72 chains,	\$4	288

\$92,216 55

6. Through flat above Ingham's from station No. 537 to station No. 573, 216 chains.

Grubbing,	54 chains,	\$6	324
Excavation, common,	44,174	8 cents,	3,533
Embankment,	90,401	12	10,848 12
Protection wall,	1,347	\$1	1,347
Two culverts six feet,			1,160 40
One lock eight feet No. 11,		\$800	6,400

One lock house,	500	500
One waste weir,	600	600
One public bridge,	600	600
One farm bridge,	500	500
One aqueduct, Little Sugar creek,		5,050
		<u>\$30,863 44</u>

7. Along narrows opposite Browntown from station No. 573 to station No. 595, 132 chains.

Grubbing,	132 chains,	\$6	792
Excavation, rock,	93,392	45 cents,	42,026 40
Embankment,	240,175	25	60,043 75
Protection wall,	33,871	50	16,933 50
			<u>\$119,797 65</u>

8. Through flat opposite Wyalusing falls from station No. 595 to station No. 642, 282 chains.

Grubbing,	150 chains,	\$6	900
Excavation, common,	69,832	8 cents,	5,586 56
Embankment,	47,235	12	5,668 20
One Lock ten feet No. 12,		\$800	8,000
One lock house,		500	500
One waste weir,		600	600
Four farm bridges,		500	2,000
Three culverts three feet		421 68	1,265 04
			<u>\$24,519 80</u>

9. Along narrows opposite Lacy street from station No. 642 to station No. 676, 204 chains.

Grubbing,	204 chains,	\$6	1,224
Excavation, rock,	123,885	45 cents,	55,748 25
Embankment,	407,756	25	101,939
Protection wall,	56,557	50	28,278 50
One public bridge,			600
			<u>\$187,789 75</u>

10. Through flat by Skinner's eddy from station No. 676 to station No. 708, 192 chains.

Grubbing,	24 chains,	\$6	144
Excavation, common,	73,406 cubic yards,	8 cents,	5,872 48
Embankment,	60,773	12	7,292 76
Protection wall,	5,901	\$1	5,901
One lock eight feet No. 13,		800	6,400

One lock house,		500
One waste weir,		600
Five farm bridges,	500	2,500
One culvert eight feet,		675 88
		<u>\$29,886,12</u>

11. Along narrows opposite Black Walnut bottom, from station No. 708, to station No. 732, 144 chains.

Grubbing,	136 chains,	at \$6	\$816 00
Excavation common,	100,970 cubic yards,	12 cents,	12,116 40
Embankment,	290,717	25	72,679 25
Protection wall,	33,883 perches	80	27,106 40
One culvert,	8 feet,		675 88
			<u>\$113,393 93</u>

12. Through flat to narrows below Whitcomb's from station No. 732, to station No. 751, 114 chains.

Grubbing,	22 chains,	at \$6	132 00
Excavation, common,	11,106 cubic yards	8 cents,	888 48
Embankment,	39,848	12	4,781 76
One lock, 6 feet, No. 14.,		\$800	4,800
One lock house,		500	500
One waste weir,		600	600
Three farm bridges,		500	1,500
Two culverts, four feet,		481 52	963 04
			<u>\$14,165 28</u>

13. Along narrows below Whitcomb's, from station No. 751, to station No. 769, 108 chains.

Grubbing,	102 chains,	at \$6	\$612
Excavation, rock,	90,553	45 cents,	40,748 85
Embankment,	240,232	25	60,058
Protection wall,	26,824	50	13,412
			<u>\$114,830 85</u>

14 Through flat opposite Meshoppen, from station No. 769, to station No. 813, 264 chains.

Grubbing,	27 chains,	\$6	162
Excavation, common,	31,811	8	2,544 88
Embankment,	64,904	12	7,788 48
Lockage at outlet, 31 feet, locks No. 15, 16, 17 & 18,		800	24,800
One lock house,		500	500

One culvert,			580 20
Five farm bridges,	500		2,500
			<hr/>
			<u>\$38,875 56</u>

15. Along flats by mouth of Mehoopenny, from station No. 813, to station No. 832, 114 chains, tow path.

Grubbing,	40 chains,	\$6	\$240
Embankment,	56,562 cubic yards,	12	6,787 44
Rip rap,	52,096 yards,	55	28,672 80
Tow path bridge at little Mehoopenny,			1,150
“ “ Big Mehoopenny,			3,300
			<hr/>
			<u>\$40,130 24</u>

1. Through narrows opposite Horse race, from station No. 832, to station No. 844, 72 chains.

Grubbing,	27 chains,	at \$6	\$162
Embankment,	273,063 cubic yards,	25 cents,	68,265 75
Excavation, rock,	13,933	45	6,269 85
Protection wall,	18,475 perches,	60	11,085
Dam,			44,374
Guard lock, 1 extra, 7,000			17,000
River lock,			20,000
One lock house,			500
			<hr/>
			<u>\$167,656 60</u>

2. Through flats below Horse race, from station No. 844, to station No. 871, 160 chains.

Grubbing,	23 chains,	\$6	\$138
Excavation, common,	218,589	8	17,487 12
2 Culverts, 6 feet, 1 culvert 3 feet,			1,582 08
			<hr/>
			<u>\$19,207 20</u>

3. Along narrows opposite Neck, from station No. 871, to station No. 918, 282 chains.

Grubbing,	282 chains,	\$6	\$1,692
Excavation, common,	4,224 yards,	12 cents,	506 88
Excavation rock,	21,478	45	9,665 10
Embankment,	672,392	[25	168,098
Protection wall,	66,393	50	33,196 50
			<hr/>
			<u>\$213,158 48</u>

4. Through flat below Neck, from station No. 918 to station No. 952, 204 chains.

Grubbing,	44 chains,	\$6	264
Excavation, common,	154,363 cubic yards,	8 cents	12,349 20
Embankment,	70,863	12	8,503 56
One public bridge,		\$600	600
Three farm bridges,		500	1,500
One culvert, 3, one culvert, 4,			903 20
			<u>\$24,119 96</u>

5. Through narrows above Tunkhannock, from station No. 952, to station No. 072, 120 chains.

Grubbing,	120 chains,	\$6	720
Excavation, common,	14,370	12 cents,	1,724 40
Excavation rock,	52,691	45	23,710 95
Embankment,	243,308	25	60,827
Protection wall,	28,236	50	14,118
One farm bridge,		\$500	500
Road,	72	4	288
			<u>\$101 688 35</u>

6. Through flat by Bowman's creek, from station No. 972, to station No. 1003, 186 chains.

Grubbing,	41 chains,	\$6	\$246
Excavation, common,	27,198	8 cents,	2,175 84
Embankment,	162,136	12	19,456 32
One lock, 9 feet, No. 19,		\$800	7,200
One public bridge,		600	600
Four farm bridges,		500	2,000
One culvert, 6, one culvert, 4,			1,061 72
One lock house,		500	500
One waste weir,		600	600
One aqueduct, Bowman's creek,			21,616
			<u>\$ 55,455 88</u>

7. Along narrows below Bowman's creek, from station No. 1003, to station No. 1025, 132 chains.

Grubbing,	132 chains,	\$6	\$792
Excavation rock,	9,962	45 cents,	4,482 90
Embankment,	211,398	25	52,849 50
Protection wall,	26,940	50	13,470
			<u>\$71,954 40</u>

8. Through Moneypenny's flat station No. 1025 to station No. 1063, 228 chains.

Grubbing,	36 chains,	\$6	216
Excavation, common,	118,615	8 cents,	9,480 20
Embankment,	96,556	12	11,586 72
Protection wall,	16,284	80	13,027 20
Five farm bridges,		\$ 600	3,000
One culvert six feet, one of four feet, one of ten feet,			1,867 28
One lock eight feet No. 20,		\$800	6,400
One lock house,		500	500
One Waste weir,		600	600
			<hr/>
			\$46,686 40
			<hr/>

9. Through narrows below Moneypenny's from station No. 1063 to station No. 1080, 102 chains.

Grubbing,	100 chains,	\$6	600
Embankment,	69,500	15 cents,	10,425
Protection wall,	23,970	60	14,382
Road, turnpike,	30 chains,	\$8	240
			<hr/>
			\$25,647
			<hr/>

10. Through flat by Keeler's from station No. 1080 to station No. 1087, 42 chains.

Grubbing,	4 chains,	\$6	24
Embankment,	37,862	12 cents,	4,543 44
Excavation, common,	3,662	8	292 96
One lock eight feet No. 21,		\$800	6,400
One lock house,		500	500
One waste weir,		600	600
One farm bridge,		500	500
One culvert six feet,			580 20
			<hr/>
			\$13,440 60
			<hr/>

11. Through narrows below Keeler's from station No. 1087 to station No. 1108, 126 chains.

Grubbing,	120 chains,	\$6	\$720
Excavation, rock,	124,000	45 cents,	55,800
Embankment,	486,797	25	121,699 25
Protection wall,	29,520	50	14,760
One public bridge,		\$600	600
			<hr/>
			\$193,579 25
			<hr/>

12. Along flat opposite Buttermilk falls from station No. 1108 to station No. 1138, 180 chains.

Excavation, common,	45,530	8 cents,	3,642 40
Embankment,	29,120	12	3,494 40
One lock eight feet No. 22,		\$800	6,400
One lock house,		500	500
One waste weir,		600	600
Five farm bridges,		500	2,500
Aqueduct, Swartwout's creek,			6,843
One culvert six feet,			580 20

\$24,560

13. Through narrows below Swartwout's from station No. 1138 to station No. 1164, 156 chains.

Grubbing,	144 chains,	\$6	\$864
Excavation, common,	76,797 cubic yards,	12	9,215 64
Embankment,	190,575	15	28,586 25
Protection wall,	36,660 perches,	80	29,328
Turnpike road,		\$8	1,152

\$ 69,145 89

14. Through flat passing Sutton's creek from station No. 1164 to station No. 1195, 186 chains.

Grubbing, none			
Excavation, common,	62,868	8 cents,	5,029 44
Embankment,	13,026	12	1,563 12
One lock No. 23 eight feet,		\$ 800	6,400
One lock house,		500	500
One waste weir,		600	600
Aqueduct, Sutton's creek,			7,524
Five farm bridges,		500	2,500
Two culverts four feet,			963 04
Turnpike road,	18 chains,	8	144

\$ 25,223 60

15. Along narrows below Sutton's from station No. 1195 to station No. 1209, 84 chains.

Grubbing,	84 chains,	\$6	\$504
Excavation, common,	11,538 cubic yards,	12	13,804 56
Protection wall,	19,740 perches,	80	15,792
Turnpike road,	84 chains,	\$8	672

\$ 30,772 56

16. Through flat by Courtright's from station No. 1209 to station No. 1232, 138 chains.

Grubbing,	4 chains,	\$6	24
Excavation, common,	31,365	8 cents,	2,509 20
Embankment,	21,737	12	2,608 44
Four farm bridges,		\$500	2,000
Two culverts four feet,			963 04
Turnpike road,	6 chains,	8	48
			<hr/>
			\$8,152 68
			<hr/>

17. Through narrows at head of Wyoming valley from station No. 1232 to station No. 1245, 78 chains.

Grubbing,	60 chains,	\$6	360
Excavation.			
Embankment,	81,977	25 cents,	20,494 25
Protection wall,	17,625	50	8,812 50
Turnpike road,	78	\$8	624
			<hr/>
			\$30,290 75
			<hr/>

18. Through flat head of Wyoming valley from station No. 1245 to station No. 1261, and $3\frac{3}{4}$ chains, (Wyoming line of Pennsylvania canal) 99 $\frac{3}{4}$ chains.

Common, excavation,	49,745	8 cents,	3,979 60
Embankment,	26,594	12	3,191 28
One public bridge,		\$600	600
Two farm bridges,		500	1,000
Two culverts five and ten feet,			1,385 76
One aqueduct over Susquehanna,			120,928 50
One lock eleven feet No. 24,		800	8,800
One lock house,		500	500
			<hr/>
			\$140,385 14
			<hr/>

RECAPITULATION.

From station No. 57, at Athens, to station No. 346, at Kellum's.

1.	Station 57 to 121	\$103,497 10
2.	121 to 148	97,687 03
3.	148 to 193	41,793 60
4.	193 to 220	121,551 71
5.	220 to 235	25,771 92
		<hr/>
		amount, 390,301 36
6.	235 to 254	41,862 29
7.	254 to 264	16,679 12
8.	264 to 291	44,397 04

9.	291 to 321	133,851 25
10.	321 to 346	31,876 16

Distance 21 miles, 56 chains, \$658,967 22

RECAPITULATION.

From station No. 346, Kellum's, to station No. 832, dam at Horse race.

1.	Station 346 to 416	\$460,670 87
2.	416 to 456	12,536 88
3.	456 to 495	234,675 70
4.	495 to 525	17,439 32
5.	525 to 537	92,216 55
6.	537 to 573	30,863 44
7.	573 to 595	119,797 65
8.	595 to 642	24,519 80
9.	642 to 676	187,789 75
10.	676 to 708	29,886 12
11.	708 to 732	113,393 93
12.	732 to 751	14,165 28
13.	751 to 769	114,830 85
14.	769 to 813	38,875 56
15.	813 to 832	40,130 24

Distance, 36 miles, 36 chains, \$1,531,791 94

RECAPITULATION.

From station No. 832, Horse race, to station No. 1261 and 3 $\frac{1}{4}$ chains, Wyoming line, Pennsylvania canal.

832 to 844	\$167,656 60
844 to 871	19,207 20
871 to 918	213,158 48
918 to 952	24,119 96
952 to 972	101,688 35
972 to 1003	55,455 88
1003 to 1025	71,594 40
1025 to 1063	46,686 40
1063 to 1080	25,647
1080 to 1087	13,440 60
1087 to 1108	193,579 25
1108 to 1138	24,560
1138 to 1164	69,145 89
1164 to 1195	25,223 60
1195 to 1209	30,772 56
1209 to 1232	8,152 68
1232 to 1245	30,290 75
1245 to 1261	140,385 14

Distance 32 miles, 17 $\frac{3}{4}$ chains, \$1,260,764 74

GENERAL RECAPITULATION.

Athens to Kellum's,	21 miles,	56 chains,	\$658,967 22
Kellum's to Horse race,	36	36	1,531,791 94
Horse race to Lackawana,	32	17 $\frac{3}{4}$	1,260,764 74
Total,			<u>\$3,451,523 90</u>

Estimate from station No. 235, West side, to station No. 321, East side, passing Susquehanna by a dam at Towanda.

1. From station No. 235, below Sugar creek, to station No. 261, and three chains at Towanda bridge, 159 chains, towing path.

Grubbing,	120 chains,	at \$4	\$480
Excavation, common,	17,524	12	2,102 88
Embankment,	24,305	12	2,916 60
Rip rap,	24,000	50	12,000
Lockage,	23 feet,	800	18,400
One lock house,			500
Raising bridge at Towanda,			8,000
			<u>\$44,399 48</u>

2. From Towanda bridge, to station No. 321, below Gibbs' on East side, 930 chains.

Grubbing,	364 chains,	\$6	\$2,184
Excavation, common,	341,269	10 average	34,126 90
Embankment,	642,135	16 "	102,741 60
Protection wall,	78,010	82 "	63,968 20
Excavation, rock,	49,571	45	22,306 95
Dam at Towanda,			66,918
Guard lock do. 1 extra,		\$700	17,000
River lock,			20,000
2 locks 6 feet, 1 of 10,—22 at		800	17,600
Three lock houses,			1,500
Aqueduct over Wysox creek,			11,504
2 culverts of 12 feet, 1 of 10, 1 of 6, 1 of 4, 1 of 3,			4,289
Seven public bridges,		\$600	4,200
Fourteen farm bridges,		500	7,000
Road, 120 chains,		20	2,400
Removing barn, (Coolbaugh's) and Gibbs' and Vancuren's houses,			250
Two waste weirs,		\$600	1,200
			<u>\$379,188 65</u>

RECAPITULATION.

From station No. 235, on West side, to station No. 321, East side, passing the river by a dam at Towanda.

1. West side, 1 mile, 79 chains, station 235 to sta. 261,	\$14,399 48
2. East side, 11 60 Towanda dam to 321,	379,188 65
<hr/> 13 59 distance, 13 m. 59 chs.	<hr/> \$423,588 13

RECAPITULATION.

From station No. 235, on West side, to station 321, East side, passing the river by a dam at Kellum's.

West side.

6. Station 235 to 254	\$41,862 29
7. 254 to 264	16,669 12
8. 264 to 291	44,397 04
9. 291 to 321	133,851 25
10. 321 to 346	31,876 16

Distance to this, 8 m. 26 chains,
11

8 m. 37 chains, Amount to Kellum's, \$268,665 80

11 chains tow path bridge over river, 28,000

East side.

1. Station 251 to 265	141,756 65
2. 265 to 301	26,479 04
3. 301 to 321	67,440 11
	<hr/> \$532,341 66

Distance, 5 m. 20 chains,
Brought down, 8 37

Distance, 13 57

General Recapitulation—Crossing at Towanda.

Athens, to sta. 235, West side,	13 m. 30 chs.	\$390,301 36
235, West side, to 321, East side,	13 59	423,588 13
321, East side, to 714, do	29 38	909,921 60
714, do to 1149, do	32 47	1,199,483 90
Total,	<u>89 m. 14 chs.</u>	<u>\$2,923,294 99</u>

General Recapitulation—Crossing at Kellum's.

Athens, to station 235, West side,	13 m. 30 chs.	\$390,301 36
235, West side, to 321, East side,	13 57	532,341 66
321, East side, to 714, East side,	29 38	909,921 60
714, do. 1149, do.	32 47	1,199,483 90
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Total,	89 m. 12 chs.	\$3,032,048 52
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Estimate of Canal on east side Susquehanna from Athens to Lackawanna creek.

1. From station No. 50 opposite Athens through flat to station No. 72, 122 chains.

Grubbing,	2 chains,	\$6	12
Excavation, common,	119,424	12 cents,	14,330 88
Embankment,	556	12	66 72
Dam at Athens,			49,474
Two guard locks,			17,000
Lock house,			500
Two farm bridges,			1,000
One river lock,			20,000
Removing Park's house,			200
<hr/>			<hr/>
			\$103,183 60
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2. Along narrows opposite Tioga point from station No. 72, to station No. 99, 180 chains.

Grubbing,	112 chains,	\$6	672
Excavation, common,	41,028	12 cents,	4,923 36
Embankment,	200,730	25	50,182 50
Excavation, rock,	24,746	45	11,135 70
Protection wall,	36,381	60	15,828 60
One public bridge,			600
One culvert four feet cord,			481 52
One waste weir,			600
Road,	160 chains,	\$12	1,944
<hr/>			<hr/>
			\$86,367 68
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3. Through New Shesheguin flats from station No. 0 to station No. 68, 408 chains.

Grubbing,	11 chains,	\$6	66
Excavation, common,	146,066	8 cents,	11,685 28
Embankment,	74,323	12	8,918 76
Lock No 1, 8.34 lift,			6,666 66
Two public bridges,			1,200
Nine farm bridges,			4,500

One lock house, four culverts of four feet and two of six feet,

3,586 48

\$36,623 18

4. Along narrows below Gore's from station No. 68, to station No. 92, 144 chains.

Grubbing,	120 chains,	\$6	720
Excavation, common,	48,018	12 cents,	5,762 16
Embankment,	166,971	25	41,742 75
Excavation, rock,	89,004	45	40,051 80
Protection wall,	35,412	50	17,706
One culvert four feet,			481 52
One waste weir,			600

\$107,064 23

5. Through Horton's flat from station No. 92 to station No. 126, 204 chains.

Excavation, common,	86,390	8 cents,	6,911 20
Embankment,	39,441	12	4,732 92
One lock No. 2 eight feet,			6,400
One public bridge,			600
Five farm bridges,			2,500
One culvert four feet, one of six feet,			1,061 72
One lock house,			500
One waste weir,			600

\$23 305 84

6 Along Breakneck and Towanda narrows from station No. 126, to station No. 159, 195 chains.

Grubbing,	180 chains,	\$6	1,080
Excavation, common,	21,005	12	2,520 60
Embankment,	213,853	25	55,463 25
Excavation, rock,	148,151	45	66,667 95
Protection wall,	40,316	50	20,158
One lock No. 3 eight feet,			6,400]
One lock house,			500
One waste weir,			600
One culvert ten feet,			805 56
Road,	192 chains,	\$12	2,304

\$154,499 36

7. Through Wysox flat from station No. 159, to station No. 239, 480 chains.

Grubbing,	136 chains,	\$6	816
Excavation, common,	135,288	8 cents,	11,063 04
Embankment,	200,527	12	24,063 24
Two locks 10 and 8 feet = 18 feet,	} 42 feet, No. 468,		33,600
Three locks, outlet,			
Seven public bridges,			4,200
Eight farm bridges,			4,000
Aqueduct over Wysox creek,			12,212
Three lock houses,			1,500
Two waste weirs,			1,200
One culvert, (Little Wysox) 12 feet,			1,00 28
Road,	54 chains,		108
Removing barn by Coolbaugh's,			50

\$93,812 56

8. Along Wysox narrows from station No. 239, to station No. 251, 72 chains, towing path.

Grubbing,	66 chains,		396
Excavation, common,	12,492	12	1,499 04
Embankment,	30,859	12	3,703 08
Excavation, rock,	11,225	45	5,042 25

\$10,640 37

1. Through Wysox narrows, from station No. 251, to station No. 265, 84 chains.

Grubbing,	72 chains,	\$6	432
Excavation, common,	181,280	12	21,753 60
Embankment,	97,747	15	14,662 05
Protection wall,	21,555	1	21,555
Dam at station 251,			44,854
Two guard locks,			17,000
Lock house,			500
One waste weir at Fifth creek,			1,000
River lock,			20,000

\$141,756 65

2. Through Standing Stone flat from station No. 265, to station No. 301, 216 chains.

Excavation common,	235,860 chains,	\$8	\$18,868 80
Embankment,	29,571	12	3,548 52
Six farm bridges,			3,000
One culvert, 4 feet, one of 6 feet,			1,061 72

\$26,479 04

3. Along narrows by Rummerfield's creek, from station No. 301, to station No. 321, 120 chains.

Grubbing,	96 chains,	\$6	576
Excavation, common,	97,624	12 cents,	11,714 88
Embankment,	200,962	15	30,294 75
Protection wall,	28,226	80	22,580 80
Culvert, Rummerfield's creek 14 feet,			1,400
Road,	42 chains,	\$6	252
Removing two houses,			200
One Culvert 3 feet,			421 68
			<hr/>
			<hr/>
			\$ 67,440 11

4. Along flat opposite French town, from station No. 321, to station No. 325, 24 chains.

Grubbing,	2 chains,	\$6	\$12
Excavation common,	16,967	12	2,036 04
Embankment,	19,180	12	2,301 60
			<hr/>
			<hr/>
			\$4,349 64

5. Along narrows by French town mountain, from station No. 325, to station, No. 352, 162 chains.

Grubbing,	162 chains,	\$6	\$972
Excavation, common,	8,991	12	1,078 92
Embankment,	157,639	25	39,409 75
Excavation, rock,	108,124	45	48,655 80
Protection wall,	38,106	50	19,053
One waste weir,			600
			<hr/>
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			\$109,769 47

6. Through Gibson's flat, from station No. 352 to station No. 391, 236 chains.

Grubbing,	50 chains,	\$6	300
Excavation, common,	84,181	8	6,734 48
Embankment,	26,644	12	3,197 28
Four farm bridges,			2,000
Two culverts, 4 feet each,			963 04
One waste weir,			600
			<hr/>
			<hr/>
			\$13,794 80

7. Along narrows above Wyalusing creek, from station No. 391, to station No. 426, 210 chains.

Grubbing,	210 chains,	\$6	\$1,260
Excavation, common,	20,767	12	2,492 04

Embankment,	398,623 chains	\$25	99,655 75
Excavation, rock,	110,636	45	49,786 20
Protection wall,	47,985	50	23,992 50
One lock, No. 8, 80 feet.			6,400 00
One lock house,			500
One culvert, 4 feet,			481 20
One waste weir,			600 32
Removing house, (Lambert's,)			100 00
			<hr/>
			\$185,268 01

8. Along flat crossing Wyalusing creek, from station No. 426, to station No. 484, 348 chains.

Grubbing,	48 chains,	\$6	\$288
Excavation, common,	86,310	8 cents,	6,904 80
Embankment,	166,887	12	20,026 44
2 locks, 6 and 8 feet—14 feet (No. 10 to 11.)			11,200
Two lock houses,			1,000
One aqueduct over Wyalusing creek,			16,506
Four public bridges.			2,400
Six farm bridges,			3,00
Two culverts, 4 feet, one of 8 feet,			1,638 92
Road, 48 chains,		\$8	384
Two waste weirs,			1,200
Removing Brown's house,			100
Bridge over Wyalusing creek,			500
			<hr/>
			\$65,148 16

9. Along narrows at Wyalusing falls, from station No. 484, to station No. 527, 258 chains,

Grubbing,	258 chains,	\$6	\$1,548
Excavation, common,	42,432	12 cents,	5,091 84
Embankment,	490,363	25	122,590 75
Excavation, rock,	165,453	45	74,453 85
Protection wall,	56,972	50	28,486
			<hr/>
			\$232,170 44

10. Through Tuscarora flat from station No. 527, to station No. 580, 318 chains.

Grubbing,	24 chains,	\$6	\$144
Excavation, common,	101,993	8 cents,	8,159 44
Embankment,	74,229	12	8,907 48
2 locks, 8 feet each—16 feet, (No. 12 to 13,)			12,800
Two lock houses,			1,000
One aqueduct over Tuscarora creek,			6,416

Four public bridges,			2,400
Five farm bridges,			2,500
Two culverts 3 feet—one of 12 feet, one of 10 feet,			1,749 20
One waste weir,			600
			<hr/>
			<u>\$44,676 12</u>

11. Along Narrows below Tuscarora creek, from station No. 580, to station No. 594, 84 chains.

Grubbing,	84 chains,	\$6	\$504
Excavation, common,	9,775	12 cents,	1,173
Embankment,	113,144	25	28,286
Excavation, rock,	45,736	45	20,581 20
Protection wall,	20,657	50	10,328 50
One waste weir,			600
Road, 84 chains,		\$12	1,008
			<hr/>
			<u>\$62,480 70</u>

12. Through flat, Black Walnut Bottom, from station No. 594, to station No. 620, 156 chains.

Grubbing,	18 chains,	\$6	\$108
Excavation, common,	28,347	8 cents,	2,267 76
Embankment,	48,603	12	5,843 16
One lock, No. 14, 6 feet,			4,800
One lock house,			500
Four farm bridges,			2,000
One waste weir,			600
One culvert, 4 feet,			481 52
			<hr/>
			<u>\$16,600 44</u>

13. Along narrows, near Overfield's, from station No. 620, to station No. 634, 84 chains.

Grubbing,	84 chains,	\$6	\$504
Excavation, common,	13,467	12 cents,	1,616 04
Embankment,	167,681	15	25,152 15
Excavation, rock,	60,216	45	27,097 20
Protection wall,	19,182	50	9,591
Road, 84 chains,		\$12	1,008
One waste weir,			600
			<hr/>
			<u>\$65,568 39</u>

14. Through Overfield's flat, from station No. 634, to station No. 656, 132 chains.

Grubbing,	18 chains,	\$6	\$108
Excavation, common,	23,977	8 cents,	1,919 76
Embankment,	32,844	12	3,941 28
Two culverts, four feet each,			963 04
Three farm bridges,			1,500
Road, 6 chains,		\$8	48
			<u>\$8,480 08</u>

15. Along narrows above Meshoppen from station No. 656 to station No. 668, 72 chains.

Grubbing,	42 chains,	\$6	252
Excavation, common,	108,380	12 cents,	13,005 60
Protection wall,	16,936	80	13,548 80
Road,	30 chains,	\$8	240
			<u>\$27,046 40</u>

16. Through flats at Meshoppen from station No. 668 to station No. 676, 48 chains.

Grubbing,	6 chains,	\$8	48
Excavation, common,	8,096	8 cents,	647 68
Embankment,	21,101	12	2,532 12
One lock 6 feet add 25, outlet lockage, No. 15 to 18,			24,800
Two lock houses,			1,000
One aqueduct over Meshoppen,			19,416
One waste weir,			600
One public bridge,			600
Bridge over Meshoppen creek,			400
Removing Sterling's house,			150
			<u>\$50,193 80</u>

17. Along narrows below Meshoppen and flats below Hollenback's from station 676 to station 714, 228 chains, towing path.

Grubbing,	192 chains,	\$6	1,152
Excavation, common,	9,680	12 cents,	1,161 60
Embankment,	77,720	15	11,658
Excavation, rock,	13,967	45	6,285 15
Protection wall,	10,296	40	4,118 40
			<u>\$24,375 15</u>

1. Along flat by Horse Race from station No. 714 to station No. 735, 126 chains.

Grubbing,	110 chains,	\$6	660
Excavation, common,	179,953	8 cents,	14,396 24
Embankment,	61,101	12	7,332 12
Excavation, rock,	29,074	45	13,083 30
Protection wall,	2,900	60	17,400
One dam,			44,374
Two guard locks,			17,000
One river lock.			20,000
One lock house,			500

\$134,745 66

2. Along narrows by (head) Horse Race from station No. 735 to station No. 763, 168 chains.

Grubbing,	124 chains,	\$6	744
Excavation, common,	29,826	12 cents,	3,579 12
Embankment,	339,763	25	84,940 75
Excavation, rock,	154,524	45	69,535 80
Protection wall,	40,155	50	20,077 50
One farm bridge,			500
One waste weir,			600

\$179,977 17

3. Along Neck from station No. 763 to station No. 803, 240 chains.

Grubbing,	20 chains,	\$6	120
Excavation, common,	174,249	8 cents,	13,939 92
Embankment,	12,350	12	1,482
One public bridge,			600
Four farm bridges,			2,000
One culvert four feet, one of ten feet,			1,287 08
One waste weir,			600

\$20,029

4. Through flat below Neck from station No. 803 to station No. 807, 24 chains.

Excavation, common,	2,233	8 cents,	178 64
Embankment,	11,896	12	1,427 52

\$1,606 16

5. Along narrows above Tunkhannock from station No. 807 to station No. 849, 252 chains.

Grubbing,	230 chains,	\$6	1,380
Excavation, common,	42,115	12 cents,	5,053 80
Embankment,	268,155	25	67,038 75
Excavation, rock,	122,849	45	55,282 05
Protection wall,	47,985	50	23,992 50
One farm bridge,			500
One culvert,			805
			<hr/>
			<u>\$ 154,052 66</u>

6. Through flat at Tunkhannock from station No. 849 to station No. 877, 168 chains.

Grubbing,	6 chains,	\$6	36
Excavation, common,	40,983	8 cents,	3,278 64
Embankment,	30,622	12	3,674 64
One aqueduct over Tunkhannock,			26,016
One lock No. 19 seven feet,			5,600
Five public bridges,			3,000
One farm bridge,			500
One culvert three feet,			421 68
One lock house,			500
One waste weir,			600
Removing two houses, Hize and Avery,			500
			<hr/>
			<u>\$ 44,126 96</u>

7. Along narrows below Tunkhannock from station No. 877 to station No. 893, 96 chains.

Grubbing,	96 chains,	\$6	576
Excavation, common,	10,600	12 cents,	1,272
Embankment,	58,369	25	14,592 25
Excavation, rock,	49,138	45	22,112 10
Protection wall,	21,170	50	10,585
Road,	90 chains,	\$12	1,080
			<hr/>
			<u>\$ 50,217 35</u>

8. Through flat above Ousterhout's from station 893 to station No. 927, 204 chains.

Grubbing,	6 chains,	\$6	36
Excavation, common,	27,834	8 cents,	2,226 72
Embankment,	44,529	12	5,343 48
One lock eight feet No. 20,			6,400
One lock house,			500
One public bridge,			600
Five farm bridge,			2,500

One waste weir,	600
One culvert four feet, one of twelve feet,	1,481 80

\$19,688

9. Along narrows below Ousterhout's from station No. 927 to station No. 945, 108 chains.

Grubbing,	102 chains,	\$6	612
Excavation, common,	3,662	12 cents,	439 45
Embankment,	175,969	25	43,992 25
Excavation, rock,	71,732	45	32,279 40
Protection wall,	25,084		12,542
Road,	90 chains,	\$12	1,080
Removing two buildings (Ousterhout's),			50

\$99,995 09

10. Through flat at Taylor's creek, from station No. 945, to station No. 968, 138 chains.

Grubbing,	3 chains,	\$6	\$18
Excavation, common,	46,851	8 cents,	3,748 08
Embankment,	7,191	12	862 92
One lock, 8 feet, No. 21,			6,400
One lock house,			500
One waste weir,			600
Three farm bridges,			1,500
One culvert, 12 feet,			1,000

\$14,629 28

11. Along narrows below Taylor's creek, from station No. 968, to station No. 979, 66 chains.

Grubbing,	60 chains,	\$6	\$360
Excavation, common,	6,834	12 cents,	820 08
Embankment,	110,476	25	27,619
Excavation, rock,	38,700	45	17,415
Protection wall,	15,524	50	7,762
Road, 66 chains,		\$12	792

\$54,768 08

12. Through flat above Buttermilk falls creek, from station No. 979, to station No. 994, 90 chains.

Excavation, common,	18,156 cubic yards,	8 cents,	\$1,452 48
Embankment,	7,682	12	921 84
Two farm bridges,			1,000
Road, 12 chains,		\$6	72

\$3,446 32

13. Along narrows by Buttermilk falls creek, from station No. 994, to station No. 1026, 192 chains.

Grubbing,	120 chains,	\$6	\$720
Excavation, common,	44,884	12 cents,	5,386 08
Embankment,	218,100	25	54,525
Excavation, rock,	64,352	45	28,958 40
Protection wall,	44,266	50	22,133
Aqueduct over Buttermilk falls creek,			9,400
One public bridge,			600
One culvert, 6 feet,			580 20
Road, 120 chains,		\$12	1,440
One waste weir,			600
Removing Sickler's house,			50
			<hr/>
			\$124,392 68
			<hr/>

14. Through flat below Buttermilk falls creek, from station No. 1026, to station No. 1050, 144 chains.

Grubbing,	48 chains,	\$6	288
Excavation, common,	23,324	8 cents,	1,865 92
Embankment,	73,311	12	8,797 32
Two farm bridges,			1,000
Two culverts, 3 feet each,			843 36
Road, 18 chains,		\$6	108
Removing Sutton's house,			100
One lock, 8 feet, No. 22,			6,400
One lock house and one waste weir,			1,100
			<hr/>
			20,502 60
			<hr/>

15. Along narrows above Gardner's creek, from station No. 1050, to station No. 1076, 156 chains.

Grubbing,	156 chains,	6	936
Excavation, common,	21,855	12 cents,	2,620 60
Embankment,	203,500	25	50,875
Excavation rock,	93,699	45	42,164 55
Protection wall,	36,888	50	18,444
Road, 120 chains,		12	1,440
			<hr/>
			116,480 15
			<hr/>

16. Through flat by Gardner's creek, from station No. 1076, to station No. 1105, 174 chains.

Grubbing,	12 chains,	\$6	\$72
Excavation, common,	15,308		1,224 64
Embankment,	55,002		6,600 24
Two locks, 8 feet each, No. 23 to 24,			12,800

Two lock houses,	1,000
One aqueduct over Gardner's creek,	6,756
Four farm bridges,	2,000
One waste weir,	963 04
Two culverts, four feet each,	

\$32,015 92

17. Along Falling Spring narrows, from station No. 1105, to station No. 1124, 114 chains,

Grubbing,	108 chains,	\$6	\$648
Excavation, common,	6,806	12 cents,	816 72
Embankment,	160,427	25	40,106 75
Excavation, rock,	84,045	45	37,820 25
Protection wall,	27,714	50	13,857
Road, 114 chains,		\$12	580 20
One culvert, 6 feet,			1,368
Removing Philips' house,			200

\$95,396 92

18. Through flat crossing Lackawanna creek, from station 1124, to station No. 1149, 147 chains.

Excavation, common,	18,805	8 cents,	\$1,504
Embankment,	105,225	12	12,627
One lock house,			500
One lock, 5 feet, No. 25,			4,000
One aqueduct over Lackawanna creek,			22,182 50
Two farm bridges,			1,000
One waste weir,			600

\$42,413 90

RECAPITULATION.

From dam on Susquehanna, at Athens, station No. 50, to station No. 251, opposite Kellum's.

1.	Station 50 to 72	\$103,183 60
2.	72 to 99	86,367 68
3.	99 to 68	36,623 18
4.	68 to 92	107,064 23
5.	92 to 126	23,305 84
6.	126 to 159	154,499 36
7.	159 to 239	93,812 56
8.	239 to 251	10,646 37

Distance, 22 miles, 28 chains.

\$615,496 82

RECAPITULATION.

From dam at Kellum's, station No. 251, to dam at Horse race, station 714.

1.	Station 251 to 265	141,756 65
2.	265 to 301	26,479 04
3.	301 to 321	67,440 11
		<hr/>
	Amount,	235,675 80
4.	221 to 325	4,349 64
5.	325 to 352	109,769 47
6.	352 to 391	13,794 80
7.	391 to 426	185,268 01
8.	426 to 484	65,148 16
9.	484 to 527	232,170 44
10.	527 to 580	44,676 12
11.	580 to 594	62,480 72
12.	594 to 620	16,600 44
13.	620 to 634	65,568 39
14.	634 to 656	8,480 08
15.	656 to 668	27,046 40
16.	668 to 676	50,193 80
17.	676 to 719	24,375 15

Distance, 34 miles, 58 chains, \$1,145,597 40

\$1,145,597 40

Deduct to station 321, 235,675 80 brought down,

\$909,921 60 am'nt from 321 to Horse race.

RECAPITULATION,

From dam at Horse Race station No. 714 to Wyoming line, Pennsylvania canal station No. 1149.

1,	Station 714 to 735	\$ 135,745 66
2,	735 to 763	179,977 17
3,	763 to 803	20,029
4,	803 to 807	1'606 16
5,	807 to 849	154,052 66
6,	849 to 877	44,126 96
7,	877 to 893	50,217 35
8,	883 to 927	19,688
9,	927 to 945	90,995 09
10,	945 to 968	14,629 28
11,	968 to 979	54,768 28
12,	979 to 994	3,446 32
13,	994 to 1026	124,392 68

14,	1026 to 1050	20,502 60
15,	1050 to 1076	116,480 15
16,	1076 to 1105	32,015 92
17,	1105 to 1124	95,396 92
18,	1124 to 1149	42,413 90

Distance 32 miles and 47 chains, \$1,199,483 90

General Recapitulation.

Athens to dam at Kellum's,	22 m., 18 ch.	615,496 82
Kellum's to dam at Horse Race,	34 58	1,145,597 40
Horse Race to Lackawanna,	32 47	1,199,483 90
Total,	<u>89 m., 53 ch.,</u>	<u><u>\$2,960,578 12</u></u>

Estimate of a tunnel 57 chains long and canal 17 chains long, between stations 735 and 783 on the east side Susquehanna.

Excavation in tunnel,	10,032	\$3	30,096
Masonry (arching)	20,164 perches,	8	1,61,312
Excavation of canal,	33,852 cubic yards,	20	6,770 40
Grubbing,	17 chains,	\$10	170
			<u><u>\$198,348 40</u></u>

Note—The above estimate is based on supposition that the tunnel will need arching throughout.

Estimate of a tunnel 57 chains long and canal 17 chains long, between stations 735 and 783 on the east side.

Excavation in tunnel,	10,032	\$3	30,096
Masonry (arching)	214,375	8	17,150
Do. towing path, walling,	2,644	3	7,932
Excavation of canal,	33,852	20	6,770 40
Grubbing,	17 chains,	\$10	170
			<u><u>\$62,118 40</u></u>

Note—The above estimate is based on the supposition that the tunnel will need arching for two hundred feet at each end only, and that the towing path will require walling throughout.

No 18.

Report of James D. Harris, Tioga line.

To William Keeler, Esq. Superintendent, of the North Branch Extension, Pennsylvania Canal.

SIR—The Board of Canal Commissioners having by a resolution of the 16th day of September last, determined the location of the North Branch division of the Pennsylvania Canal, from the village of Athens, near the New York state line, to Wyalusing creek; and by a resolution of the same date directed the engineer to prepare the line for contract; this duty was at once entered upon, and completed throughout, on the 8th day of October. The details of the location are as follows:

For the purpose of feeding the canal with water, dam No. 1 was located near the head of the village of Athens. It is designed to be $8\frac{1}{2}$ feet in height above low water, and 400 feet in length, between the abutments. The depth of the water here at a low stage, is $2\frac{1}{2}$ feet in the Chemung. The foundation of the dam will be gravel, which is believed to be tolerably compact. In determining the precise location of the dam, due reference was had to the contemplated extension of the canal up the valley of the Susquehanna, as well as up the valley of the Chemung, and the works are so planned, that the pool of this dam will serve as a medium, by which the Chemung will be passed, by the aid of a towing path bridge; thus accomodating the trade destined to, or coming from the upper part of the valley of the Susquehanna, in the event of the continuation of the canal in that direction. The pool will be a good depth for boats for $1\frac{1}{2}$ miles above the dam, and will facilitate the extension of the canal up the Chemung, whether it may pursue the east or west side of that river. If the west side should be found most eligible, a bluff $\frac{3}{4}$ mile in length, below McDuffie's mill, (a very formidable obstacle in the way of constructing a canal,) will be passed in a comparatively cheap manner, on the pool aforesaid.—Between the dam, and the hill on the west side of the Chemung, a bank will be raised 20 feet in height above canal bottom, and about 10 feet higher than the present surface of the flat; and 15 feet wide on top with the usual slopes. This bank will be 13 chains long.

As a full supply of water to meet any emergency was deemed of the first importance, the site of the dam was so fixed as to admit of introducing into the pool an abundant supply from the Susquehanna; by erecting a low dam within the limits of the state of Pennsylvania, in case of a deficiency in the Chemung; an event which, although possible, in consequence of the increase of trade, yet not likely to occur for some years to come. The feeder for this purpose would be about 2 miles, and 20 chains in length.

From the dam at Athens the canal will pass through flats for 5 miles, and 20 chains to station No. 140. This portion of the line embraces sections No. 1, 2, 3, 4, 5, 6, 7, 8, 9, and part of 10. A guard lock will be placed at the dam, and a second guard lock at station No. 97, a distance of 3 miles and 51 chains below the dam. In the intermediate distance two waste weirs will be placed; each of which will have a lift of 100 feet in length. One is located at the distance of 2 miles, and the other three miles below the dam. By these waste weirs the water of the river will be permitted to enter the canal at times of high freshets, and will consequently in a great measure counteract the pressure of the water on the outside of the bank, and prevent breaches. The towing path bank will be 20 feet in height, above bottom of canal at the dam, and will diminish in height by a regular gradation; so that at the second waste wier, 3 miles below the dam, it will be 12 feet in height, and this elevation will be preserved thence to the second guard lock. From this point it will diminish regularly, in such ratio, that at station No. 134, the banks will be brought to the *minimum* height of six feet, above canal bottom. This will place the top of the bank six feet above the highest floods throughout. The guard locks are intended to be used as lift locks at times of high freshets. By this arrangement of the guard locks, and waste weir gates, this portion of the line may be rendered secure against the freshets of the river.—The cutting is deep through sections 1, 2, 3, and part of 4; thence to the end of the flat the ground is sloping, and rather favorable. The grubbing on this portion of the line is light. The excavation is chiefly gravel and clay.

From station No. 140 to station No. 180, a distance of 1 mile, and 10 chains, comprising part of sections 10, 11, and part of 12, the canal will pass by narrows, and will require to be protected by a wall. The grubbing is heavy on this portion of the line. The excavation will be principally gravel and slate. A proportion of the stone for the wall may be procured on the sections. The embankment necessary in the river will constitute a large item in the expense of passing those narrows.

From station No. 180 to station No. 280—distance 3 miles and 60 chains, the track of the canal lays through the Ulster flats. This portion of the line embraces part of sections 12, 13, 14, 15, 16, 17, 18, 19, and part of 20. The grubbing here is light, the excavation is gravel. The ground is favorable for a canal. The line comes in contact with the public road on sections 15 and 16. At this place it will be best to change the road so as to keep it above the canal, as also on sections 19 and 20, where they will likewise interfere with each other.

From station No. 280 to station No. 324, a distance of 1 mile and 52 chains, comprising part of sections 20, 21, and part of section 22, the line is traced along a bluff; rising for a portion of the distance to the magnitude of a mountain. The face of the bluff is precipitous, consisting principally of rock in strata suitable for protection wall. It is probable that stone suitable for aqueducts, locks and culverts, may

be procured on penetrating the bluff. The grubbing is heavy throughout. The excavation on a part of sections 21 and 22, consists of cemented gravel, alternating with strata of sand and clay; which by reason of being moistened by the water oozing from above the clay, has a tendency to slip, rendering it necessary to build the canal principally in the river, to prevent it from being filled by the sliding earth. A large quantity of embankment will be required on this part of the line. At this point it will be a saving of expense, and security to the canal, to drive a row of piles on the upper side of the canal about 10 feet apart, behind which timbers could be placed which would form a wall back of the piles capable of resisting the pressure of the bank of earth. This wall may be built two feet higher than the surface of the water in the canal. That portion of the timber which would be below the surface of the water, would from that circumstance be preserved from rotting. The whole of this portion of the canal will require walling on the side next the river. The public road will have to be altered past sections 20 and 21, and part of section 22, and carried along the hill back of the canal.

From station No. 324, to station No. 353, a distance of 1 mile and 22 chains, the line passes along the flats in the vicinity of sugar creek; crossing that stream at station 340. This part of the line embraces part of sections 22, 23 and 24. The grubbing is generally light—about 40 chains are heavy. The excavation is gravel and clay. It is intended to change, and straighten the course of the creek, and carry the earth which will come out of the new channel into embankment, of which a considerable quantity will be required at the aqueduct. A good rip rap wall will also be required, to protect the banks from injury by the freshets of the stream. At station, No. 357, the canal will meet the slack-water, which will be created by the dam to be erected at Towanda.

From station No. 358, to station No. 412, a distance of two miles, and two chains, comprising sections 25 and 26, of towing-path, the improvement will be slackwater, passing in front of the village of Towanda. The grubbing is rather heavy. The excavation is chiefly gravel, a portion of which is partially cemented. Section, No. 26 terminates about fifty-one feet below the bridge, which crosses the river at Towanda, and eleven hundred and sixty feet above the site of dam No. 2. For the purpose of giving that finish to the work, which the preservation of symmetry demands, in the immediate vicinity of a considerable village, it will be necessary that the buildings on the brow of the river bank in front of the village, should be removed. The number, and value of those buildings, is not so great as to render the expence of their removal very considerable.

Dam, No. 2, is located near the lower termination of the village of Towanda. It will be thirteen feet in height, above low water, and eight hundred feet in length between the abutments. The depth of water in the river here, at a low stage, is four feet. The foundation of the dam is rock on the south-west side of the river, and gravel on the opposite side. The rock has a slight dip from south-west to north-

east; and the rock is discernable for one third of the breadth of the river. A bank will be raised twenty feet in height above canal bottom, and twenty feet wide on top with the usual slopes, reaching from the abutments to the hill, on both sides of the river; a distance of about fourteen chains in all. The location of the dam at this point will favor the transportation of the coal from the mines on Towanda creek, and give a greater value to the surplus water, than it would have if erected at any other point on the route of the canal. With moderate expense, compared with the importance of the object, a canal may be cut from the south-west end of the dam, parallel with the bank of the river, at a convenient distance from it, and extended so far in the same direction, as to form a basin of sufficient capacity for all the hydraulic purposes of the site, and accommodate all future demands of the coal trade. The water could also be used on the opposite side of the river, for propelling machinery, but with greater risk to the dam, and its appendages. Sales of water privileges, which have recently been made, by incorporated companies, confirm the opinion which has been long entertained, that a mass of wealth, in the form of dormant water power, has been too long hoarded by the state; which, if unlocked, would prove an important direct source of revenue to her, give profitable employment to many of her citizens, and an accession of business to her canals.

From station No. 412, to station No. 561, a distance of five miles, and forty-seven chains, comprising sections 27, 28, 29, 30, 31, 32, 33, 34, and 35, the canal will pass over flats. This portion of the line crosses the Susquehanna at Towanda, between stations 412 and 415, and crosses Wysox creek at station 534. The canal will be carried directly to the hill on the north-east side of the river, and will then pursue the flat at the base of the hill, to the guard lock, opposite dam No. 2. This part of the canal is intended to be sixty feet wide at the water line. The canal will continue along the base of the hill from the guard lock, until it meets the river on section 29, which section will require walling to protect it from the river, for near its whole length. The ground thence to station 561, is favorable, with the exception of the valleys of Little and Big Wysox, where heavy embankments are required. A guard lock will be placed at the point where the guard bank extending from the north-east abutment of dam No. 2, meets the canal, and a second guard lock will be placed at station No. 471, a distance of one and three-fourth miles, below the first. By means of these two guard locks, the water in the canal can be regulated at a time of freshets, so as to counteract the pressure of the water on the out side of the bank, and serve as lift locks in such emergency. The banks of the canal will be twenty feet in height above canal bottom, at the guard lock opposite dam No. 2, and will regularly diminish in height, to the head of section No. 32, where they will be brought down to the ordinary height of six feet above canal bottom. The grubbing on sections 28, 29, 30, and 31, is rather heavy. On the remaining portion of this distance it is light. The excavation is chiefly hard gravel with a portion of clay, and loam. The public

road will have to be altered, from Wysox creek, to station 561, and a new road made back of the canal.

From station No. 561, to station No. 601, a distance of one mile and forty chains, embracing sections 36, 37, and part 38, the line passes along narrows, nearly the whole of section 36, presents a face of rock, which is nearly perpendicular. The grubbing is rather heavy on this portion of the line. The excavation on section 36, is chiefly rock. On the remaining two sections, it is principally gravel. The embankment necessary in the river, forms a very large item of the expense of passing this bluff. The whole of this portion of the canal, will require a wall to protect it against the river. The public road will have to be changed past sections 36 and 37, and carried along the face of the hill above the canal.

From station No. 601, to station 672, a distance of two miles, and fifty-three chains the line pursues the standing stone flats, and comprises in this distance part of section 38, sections 39, 40, 41, and part of 42. The grubbing is light, and excavation easy, principally gravel and loam. A considerable quantity of embankment is required at Fitch's creek on section 38.

From station No. 672, to station No. 734, a distance of two miles and twenty-six chains, embracing part of section No. 42. sections 43, 44, 45, and 46, the line follows near, and on the bank of the river, and crosses Rummerfield's creek. The grubbing is heavy generally. The excavation is chiefly gravel and clay. A considerable quantity of embankment will be required on all the sections, embraced in this distance particularly on section 44, at Rummerfield's creek. The canal will have to be protected by a wall, for the greater part of this distance. The road will have to be altered, and carried above the canal, opposite sections 42, 43, and part of 44.

From station No. 734, to station No. 801, a distance of two miles, and forty-one chains, the line pursues the base of the French town mountain, and comprises sections 47, 48, 49, and part of 50. The grubbing is heavy throughout. The excavation is principally solid, and detached rock. A considerable proportion of the excavation of sections 47, and 49, is solid rock. The canal will be built in the river, in part here; consequently a large quantity of embankment is necessary. This portion of the canal will require to be protected by a wall, throughout its whole length.

From station No. 801, to station No. 868, a distance of two miles, and forty-one chains, embracing part of section 50, sections 51, 52, and 53, the line passes over flats. The ground is generally favourable. The grubbing is light. The excavation is chiefly hard gravel. A considerable quantity of embankment is required at a brook on section 53.

From station No. 868, to station No. 940, a distance of two miles, and fifty-six chains, the line pursues the base of the mountain above Wyalusing creek. This portion of the line includes sections 54, 55, 56, and part of section 57. The grubbing is heavy throughout. The excavation is chiefly earth, and detached rock. The embankment,

forming the outer bank of the canal, will constitute a large proportion of the expense of this part of the line. There is a considerable quantity of solid rock, on section 56. Through the whole length of this portion of the canal, a protection wall will be required.

From station No. 940, to station No. 952, a distance of thirty-six chains. The canal will pass over a flat, crossing Wyalusing creek, at station 951. It embraces part of section 57, and the whole of section 58. At the point where it leaves the river, it enters an elevated point of land. The ground raises gradually, from the bank of the river, to the distance of nine chains, where the cutting is found to be thirty-six feet; thence it falls off in two chains, to one foot cutting. From this place to the creek, the ground is favorable. The grubbing is light, on this portion of the line. The excavation is gravel. At the creek a considerable quantity of embankment is required. The estimated cost of the sections is \$758,019 11.

The four guard locks to be erected on this line will be of stone, neatly hammer dressed and chiselled at the joints, so as to make close work. The stone work is to be laid in courses, which will in no case be less than ten inches thick. The headers will be four feet in length, and one fourth wider than their thickness. The beds and heading joints of the face work will be wrought perfectly square to the face. The backing will be laid in courses, corresponding in thickness with those of the face respectively, and the whole work will be bound in the most faithful manner, and finished with a course of coping, twelve inches thick and three feet wide, which will be well clamped with iron. Any space in the heart of the wall not occupied by headers of the face and back, will be filled with stones twenty inches wide by three and a half feet in length, placed transversely in the wall, so as to bind most effectually. The stone work is to be laid in good New York cement, and thoroughly grouted with the same material. The cost of the guard locks as estimated, will be \$29,229 90.

The lift locks, of which there will be three of six feet lift, two of seven feet lift, one of eight feet lift, one of nine feet lift, one of twelve feet lift, and one of thirteen feet lift, will be laid dry. They are to be built of large well shaped stone; the headers in the face are to be in no case less than four feet long, and twelve inches wide, and eight inches thick. The hearting is to consist of stones which shall contain not less than three cubic feet. The stone work below the lower gates is to be well jointed, and the whole wall is to be laid in the most substantial manner, and coped with a course of stones which will be twelve inches thick and three feet wide, and clamped with iron. Studding will be set up in front of the wall, at three and a half feet from centre to centre, from the lower gates to the head of the lock, and bolted to the wall with iron bars, against which a course of two inch jointed planks will be well secured with spikes. This plank facing will be carried up so high, as to meet the underside of the coping. A water way will be constructed at all of the lift locks, except the outlet lock above Towand, for the purpose of feeding the lower level. The aggregate lockage on

this line is seventy-four feet; the estimated costs of the lift locks, including the water ways is \$49,335 00.

The work of the bottom, puddling, sheet piling and gates of all the locks is to be executed in the most permanent manner.

The aqueducts are to be built of heavy stone, laid dry; the masonry will be rubble work; the stones generally, are to contain, not less than six cubic feet each, and no stone in the work is to contain less than three cubic feet, except for filling the interstices, which will remain after the large stones in the heart of the wall. The stones in the back to be similar in size, to those of the face of the wall. The stones for the face are to be truly squared, except that an allowance will be made for the batter; the wall will be finished with a course of coping one foot thick, and three feet wide, which will be well clamped with iron. The foundation of all the aqueducts is gravel; the stone work will be started on a platform of timber and plank, which will be sunk to the depth of six feet below low water, and deeper if circumstances require it. The foundations will be well secured by throwing around the abutments and piers a rip rap of brush and stone. If the case requires further security, piles fifteen feet in length will be driven around the foundations, and a body of brush and stone rip rap placed adjoining the piles in such positions as to guard the foundations most effectually. The superstructures of the aqueducts have not yet been put under contract, nor have the plans of this part of the work been yet decided upon. There will be three aqueducts on this line, which has been put under contract, viz: one over Sugar creek, one over Wysox creek, and one over Wyalusing creek. The aqueduct over Sugar creek, will consist of three spans of sixty-five feet each; that over Wysox will consist of three spans of sixty feet each, and that over Wyalusing will consist of three spans seventy-five feet each. The cost of the aqueducts as estimated, will be \$49,911 20.

The dams are to consist of crib work formed of round and square timber. After the foundation has been excavated to the proper depth and at all places to the depth of two feet below low water, a course of hemlock brush will be spread over the area, to be occupied by the crib work of the dam. The thickness of the course of brush will be governed by the depth of the water, but it will be brought to a uniform level surface throughout, and upon it at the mudsills, (which will be flatted timbers) will be placed at right angles to the stream. Upon these mudsills round timbers eighteen inches in diameter, and from fifty to sixty feet long will be placed close together, parallel with the thread of the stream. They will be notched down on the mudsills and form a close platform for the whole length of the dam. Upon the platform the crib work will be commenced; the round timbers of the crib work will be from eighteen to twenty inches in diameter, and will constitute ties, lying parallel with the thread of the stream. The square timbers (termed range timbers,) will be from twelve to twenty inches square, and will be placed at right angles to the ties, and firmly let into them, by notching the round timbers, and will be well secured down to them, by means of dry white oak pins, two inches in diameter,

and twenty-four inches long, forming cribs with the tie timbers about nine feet square in the clear. These cribs will be completely filled with stone, except the lower range adjoining, and under the breast, which will be left empty. At the lower point of the platform timbers, the crib work will be built plumb for two feet in height, meeting the lower termination of the breast. Here a slope will commence which will meet the comb, at an inclination of two and one-fourth feet base, to one foot perpendicular. The top range timbers forming this inclination will be firmly secured to the tie timbers, with bolts of iron one and a half inches square. The breast plank which will be six inches thick, will then be well pinned and bolted to the range timbers on which they will rest. The finishing course of range timbers, on the upper slope of the dam, will be so placed as to form a slope of five feet base to one foot of perpendicular height; upon these range timbers the spans (twelve inches square) will be placed, which will extend from the comb of the dam to the mudsill at the upper side of the dam. These spans will be well secured to the range timbers with two inch pins, and will be laid so as to form tight work from the comb to the range plank, which will be bolted down on the span at the distance of eight feet from the comb. The whole area from the range plank, to the bottom of the upper slope of the spans, will be covered with a double course of jointed plank, which will be well secured to the spans with seven inch spikes. At the bottom of the upper slope, a double course of sheet piling will be put down tightly to the bottom of the river, which will join the plank of the spans on the upper mudsill. Above the sheet piling a course of good puddling is to be placed and well rammed in. The whole dam is to be gravelled above the upper slope; the graveling will extend fifty feet above the crib work on the bed of the river. The abutments will be sunk to the depth of six feet below the lowest water; they will be built of heavy stone, laid dry, in courses which will in no case be less than sixteen inches thick. The headers will be four feet long in all cases, and a proportional breadth, and they will alternate with stretchers of similar size. The abutments will be raised to the height of fourteen feet above the comb of the dam. Below the abutments a crib will extend fifty feet down stream, and twenty-five feet into the banks, and twenty feet in height to add security to the work. And to give further security, piles fifteen feet long are to be driven at such points, as may be deemed necessary. No other dams will be required on the line which has been put under contract, than those referred to, (Nos. 1 and 2.) The cost of the dams will be \$86,865 24.

Bids have been received at the late letting for the river locks, as well as shoots at the dams, with a view to make a comparison of the advantages of the two modes of passing the dams, (with the river craft,) taking into view the expense of the structures. In order to make the comparison, it is desirable to ascertain with some degree of accuracy, the number of floats which will have to be passed through the dam, when a favorable freshet may occur. For the purpose of giving time to gain this information, the decision on the

two modes has been postponed. In the mean time the contractor will make preparations for erecting the abutments and other parts of the dam, and no delay will be occasioned in the final completion of the whole work. The *positive* safety of locks is an argument of considerable weight in their favor. It is indispensably necessary however, to provide a mode of passing the dams, which will not be productive of onerous delay to the business. If locks should be adopted, they should be one hundred and eighty feet long, by twenty-four feet wide, in the chamber, and furnished with such number of wicket gates, as would facilitate, and expedite to the utmost the passage of crafts. A schute, if constructed at dam, No. 1, on the Chemung (at Athens) would have to be near six hundred feet long. At dam, No. 2, the schute would have to be at least one thousand two hundred feet long. The scite of the former will be gravel, but otherwise favorable. The scite of the latter is a rock, well adapted to the purpose. The dip of the rock favors the object, as the bottom of the river may be said to be *shingled*, in a manner which will admit the water of the schute to glide over it without subjecting it to be torn up by the current. The walls of the schute will be crib work, built of square timber, filled with stone, and paved on top. The bottom of the schute will be raised with stone, placed in it promiscuously, upon which it will be paved with stone two feet in depth, so as to form a grade nearly regular, from a level point at the head of the schute, three feet in perpendicular depth lower than the comb of the dam, and extending to within one hundred feet of the tail of the schute. The head of the schute will be at such distance above the dam, as to place the entering craft at a safe distance from the influence of the overfall of the dam. A double course of sheet piling will be put down at the head of the schute, which will extend from the dam along the schute walls, circumscribing the head of the schute, and forming a connection with the adjacent bank, so as to cut off leakage through the schute. This sheet piling will be carried up to the height of one foot above water line. A fixture will also be placed at the head of the schute, by which it may be closed at a time of low water if necessary. The general plan of the schutes is the same with that in the dam at Dunnsburg on the West Branch. The dam at Dunnsburg is eleven feet in height above low water.

It has been deemed best for the present purpose to make the estimates on the supposition that the schutes would be built, and the locks dispensed with. The cost of the schutes as estimated, will be \$34,718 30.

There will be nineteen culverts required on this line of the following dimensions: two of three feet chord, seven of four feet chord, two of six feet chord, four of eight feet chord, one of ten feet chord, one of twelve feet chord, and one of twenty feet chord. A cast iron pipe eighteen inches in diameter will also be required, to serve the purpose of a culvert. The culverts will be founded on a platform of timber, except in cases where a foundation of rock exists, in which case the stone work will be started on the rock. The timber platform

will always be laid so low, as to be constantly covered with water. The arch stones of the culverts will be laid in courses throughout, which will be truly dressed to the radius of the curve, for the whole depth of the stones. The abutments, parapets, and wings are to be coursed masonry, and to be built of well shaped stones of proper size, and laid in good lime, and sand mortar, and grouted with the same mixture. The parapets and wings are to be surmounted with a course of coping ten inches thick, and three feet wide. The estimated cost of the culvert is \$16,688 15.

Two towing path bridges will be required on this line, viz: one over a ravine near the head of the village of Towanda, which should be forty feet in the clear, between the abutments, to admit of a convenient communication between the pool of the dam, and a harbour which may be formed within the ravine, sufficiently capacious to contain six canal boats, and which will accommodate the business of this part of the town, and neighborhood. One other towing path bridge will be required to pass the pool of the dam at this place. By an arrangement between the board of canal commissioners, and the company owning the bridge erected on the Susquehanna at this place, the state will have authority, by her agents to make such alterations on the structure as will be necessary to adapt it to the purposes of a towing path bridge, without permanently impairing its value as a road bridge, and the state will be allowed the use of it forever as a towing path bridge, free of charge. The bridge is new, having been erected in 1834-5, and the location being suitable, it is considered a judicious arrangement for all concerned. It will have to be raised about seven feet higher than it now is, in order to place it at a safe height above freshets, when the dam is erected. The estimated cost of the towing path bridges is \$13,355.

There will be eight public road bridges required. They will be forty-three feet in the clear, between the abutments, and the road way will be sixteen feet in the clear in width, between the rails. The underside of the string pieces will be fifteen feet above bottom of canal. The abutments will be strong rubble work, laid dry. The abutment on the towing path side will be built to the height necessary to receive an eight inch levelling timber, upon which the string pieces will rest. The abutment on the berm side will be built up to the height of five feet above bottom of canal, without wings. Upon it a double framed bent will rest, with caps for the string pieces to rest upon. Thin cast iron plates will be placed between the caps, and string pieces to prevent them from coming in contact, and thereby causing each other to decay. Short string pieces will connect the bent, with the embankment on the berm side. The whole of the wood work will be painted, with three good coats of white lead, and oil. This bridge will be less expensive, than those which have been generally built on our canals, and will be more permanent. The cost of the public bridges as estimated is \$4,800.

There will be thirty-eight farm bridges required. The plan of the farm bridges is the same in every respect, with the public bridges,

except that the road way will be twelve feet instead of sixteen wide in the clear, between the rails. The estimated cost of the farm bridges is \$19,000.

There will be thirteen waste weirs required, the plan of which is not yet entirely matured. They will have an average lip of eighty feet, and will each be furnished with four large sized cast iron wicket gates, to pass the water when necessary. The estimated cost of the waste weirs is \$11,200.

There will be eleven lock houses needed, the aggregate estimated cost of which is \$6,600.

It is estimated that fourteen thousand perches of fence will have to be made on this line, the estimated cost of which is \$14,000. The castings necessary for locks, &c., are estimated to cost \$2,000. The hydraulic cement for the guard locks, is estimated to cost \$5,000. The cost of road to be removed and renewed, is estimated to be \$6,000. The cost of removing buildings on the track of the canal is estimated at \$1,500. For the estimates more in detail, I beg leave to refer you to the tabular statements accompanying this report.

The aggregate cost of the whole line under contract, (35 miles and 56 chains,) based principally on the prices at which the work was allotted, will be \$1,108,251 90. In cases where the jobs have not been let, the prices have been supplied by an estimate. The cost, agreeably to this result, will fall short of the estimate reported to the board of canal commissioners on the 25th August, in the sum of \$46,091 00. Inasmuch as there has been a gradual increase in the price of labor and provisions for some months back, and there is a prospect of continued high prices for some time to come, it is deemed proper to add to the present estimate fifteen per cent., to cover contingencies, making the estimate amount in all to \$1,274,489, or about \$32,879 per mile.

It will be proper here to remark, that in the location of the canal, the importance of placing it at such an elevation above the river as would render it secure against freshets, has been kept constantly in view, in the progress of the location. The bottom of the canal for some miles below the dams, is necessarily depressed below the height of freshets, but such precautions are taken, as before described, at those points, as will prevent injury even there. The rule laid down, and which has governed throughout, except at those two points, was to place the bottom of the canal above the highest freshets of modern times.

In relation to this line of improvement, it may be proper to observe, that but few quarries have been opened affording stone suitable for cut stone locks. Indeed, the only material on the route which is known to be suitable for that purpose, is in the vicinity of Tioga Point. Hence the adoption of the plan of lift locks with dry walls, for which purpose suitable stones are found in sufficient quantities. This plan of lift lock is indeed little inferior to a cut stone lock, if well constructed. If the chamber is kept generally full of water, which may be done, during those months in which decomposition is most rapid, they

may be preserved for an indefinite length of time. It was considered important to build the walls of the guard locks of cut stone entirely, and lay them in cement, as they will be more exposed to decay than the lift locks. Stone of good size and quality for culverts, bridges and protection wall exists in abundance in the vicinity of the line. Timber of the best quality can also be had in abundance here, both pine and oak. Good lime is scarce, and it is probable that this material will have to be brought from Ithica, in the state of New York, or from Berwick. It is only needed in the culverts, and it may be found advantageous to substitute hydraulic cement in the place of it, as the prices of the two kinds of lime approximate so nearly. The material for the banks of the canal, and for puddling, is found generally on the track of the canal in abundance and of the best quality. At a few points along the Frenchtown mountain, and Wyalusing Narrows the material for lining the canal will have to be transported a considerable distance.

No difficulties are anticipated in the construction of this work beyond what are obvious on an inspection of the route.

Since the letting, which closed on the 25th of October, a number of the contractors have commenced operations on their jobs, and are actively prosecuting their work. It is to be expected that the heavy character of the work on this line will induce laborers to come here for the purpose of having steady employment during the winter months. The whole work may be completed by the 1st August, 1838, as required by the contracts, provided the funds are furnished as required.

Respectfully submitted,

JAMES D. HARRIS, *Engineer.*

CANAL OFFICE, TOWANDA, }
November 18th, 1836. }

Communication from the Canal Commissioners, accompanied with a Report of B. Aycrigg, Principal Engineer appointed to explore the country between the West Branch improvements and the town of Franklin, on the Allegheny river.

CANAL COMMISSIONERS' ROOM,

December 15, 1836.

His Excellency, JOSEPH RITNER,

Governor of Pennsylvania.

SIR—By direction of the board, I transmit to you the report of B. Aycrigg, principal engineer appointed to explore the country between the West Branch improvements and the town of Franklin, on the Allegheny river.

Very respectfully,

MOSES SULLIVAN, *President.*

Harrisburg, Dec. 13, 1836.

TO MOSES SULLIVAN, Esq.

President of the Board of Canal Commissioners of Pennsylvania.

SIR—We arrived at this place on the morning of the 11th inst. having examined the dividing ridge and completed a connected line from the mouth of Red Bank on the Allegheny to the mouth of the Sinnemahoning, on the West Branch, a distance of one hundred and twenty-eight and one-fourth miles, and taken the requisite notes for a detailed estimate accompanied by a topographical map of the country included in the examination.

No examination was made on the Allegheny since it had been already three times levelled, and the expense of different plans of improvement reported. The length of the time during which we could work being limited, that part was preferred, of which least was known, and therefore having reached the Allegheny we returned to the summit and proceeded eastward, in order if possible to connect our line with the head of the improvements on the West Branch. This, however, we found impracticable, since the river freezing, precluded the possibility of our being accompanied by our tents and camp equipage in a country without roads, where our only means of transportation was by water.

The levels and survey having been taken with the same precision as in the preliminary examinations, for a work whose construction was authorized by law, it will require several weeks to prepare an estimate, and in the mean time the following general view of the subject is respectfully submitted to the board.

Having obtained all the information that was available from the official reports of former examinations, and from individuals who were acquainted with the country to be explored; the greatest reliance was placed upon the account given to me personally, by William Wilson, Esq. having called on him for this purpose; at his residence in Williamsport.

From his examination, he had formed the opinion, that if a water communication could be at all effected, it must be by connecting the waters of Bennett's branch of the Sinnemahoning with those of Sandy Lick, and from his description of the ground, together with his notes of the levels, the conclusion was formed, that although other routes might be practicable, from resources that had been overlooked from the circumstance of their not being obvious, or not observed in a country, the greater part of which is a wilderness, this at least possessed the greatest facilities as far as ascertained. However, to leave nothing uncertain, a crest line was commenced ten miles south of the Franklin turnpike, at a depression in the dividing ridge, between the waters of the Mahoning and Woodside's run, mentioned in Mr. Mitchell's report of 1827, as the 'Clover patch,' and thence northwardly along the ridge between the heads of the Mahoning and Sandy Lick on the west, and Curry's run, Anderson's creek and Bennett's branch of the Sinnemahoning, tributaries of the West Branch on the east.

From this examination, it was ascertained that the summit reported by Mr. Wilson, between Bennett's branch and Sandy Lick, is the lowest in this range of country, being one hundred and twenty-seven feet lower than the lowest of those between Sandy Lick and Anderson's creek, three hundred and eight lower than any between Anderson's creek and the Mahoning, three hundred and sixty-seven below the Mahoning and Curry's run, and four hundred and fifty-five below the Clover Patch.

The height of all the depressions between the Clover Patch and Boon's mountain, having been thus settled, and Mr. Wilson having previously found that the summit of Elk and West creeks, between the Driftwood and Clarion, and the lowest north of Boon's mountain, was one hundred and eighty feet above the one proposed; the examination was next made to ascertain the amount of water that could be commanded on the summit level at the height proposed by Mr. Wilson, or two hundred feet below the crest of the depression, and from this it was found that the drainage on the eastern side of the ridge would be collected from twenty square miles, and on the western side a fraction over eighty square miles. The different streams mentioned by Mr. Wilson, were not gauged separately since their minimum flow is a matter of no importance, according to the present proposed plan of improvement; but Sandy Lick below the forks of Fall's creek, and

containing the water of all these runs together, was gauged during the dry weather and found to yield the insignificant amount of three hundred and seventy five cubic feet per minute.

This has hitherto been considered an insurmountable difficulty; but when the proper view is taken, proves to be one of the most favorable circumstances connected with the subject, and requires elucidation for those who are not familiar with the western section of the state, or perhaps have never reflected upon its bearing on the subject under consideration.

The geological structure of the country west of the Allegheny mountain, and consequently on the proposed summit, differs materially from that on the eastern side. The rocks lie in horizontal strata, and are principally graywacke-slate, and clay-slate, accompanied by bituminous coal and clay, the three latter almost impervious to water; and hence we find on the summit of narrow ridges, and in dry weather, muddy roads and swampy ground. The surface of the country, also presents peculiar features. Although there is at present, scarcely a piece of high level ground to be found, still the whole of this country must have been originally a rolling table land with innumerable rills, which in the course of ages have worn out deep ravines, leaving the summits of the ridges almost sharp, and the whole together forming what might almost be compared to the roofs of a large irregular city with their water tight surfaces, discharging the water immediately into the gutters below, and these into the drains, by means of which it is soon carried off, so that in a short time after a rain, hardly a vestige of it remains.

This peculiarity of the western streams, rising rapidly and as suddenly falling, may be aptly illustrated by an example.

As before observed, the flow of Sandy Lick below the mouth of Falls creek, was but 375 cubic feet per minute. On the 10th of September when at a short distance below this place, but without any intervening stream of importance, we had a thunder storm in the afternoon and night, and found the water on the next day flowing at the rate of 21,437 cubic feet per minute; and again in two days reduced to 2,371 cubic feet per minute.

Could the water find its way into the earth as it does in the eastern section of the state, or on Boon's mountain, or if retained by land comparatively level, the streams would neither rise nor fall so rapidly, and being fed by springs from these natural reservoirs, would present a more imposing appearance in a dry season; but at the same time the total amount discharged by the streams, would be less in proportion to the water retained over an extended surface, and consequently exposed to evaporation in a much greater degree, than in a comparatively dry country. If there was no basin that could by artificial means be converted into a reservoir capable of containing the water, we should lose the benefit of nearly all the floods; but in this respect, the valley of Sandy Lick creek is remarkably favorable; since even in this elevated region, a mound of $\frac{3}{8}$ of a mile and extreme height of 40 feet, will give us a reservoir of three square miles, with a useful depth of

twenty feet. This reservoir will at the depth of twenty feet, contain 1,672,704,000 cubic feet of water. A lock proposed to be fifteen by nineteen feet, and lift near the summit five feet, will contain 6,750 cubic feet. Suppose it practicable to pass a boat every three minutes and that every three boats will on an average require two locks full of water at each end of the summit, (though in a crowded trade such as we are now considering, it would approach nearly to one lock full for two boats.) This would require one lock full every two and a fourth minutes, or 156,600 locks full in two hundred and forty days to pass 115,200 boats, requiring for lockage 1,036,800 cubic feet per annum. Allow fourteen miles to be constantly supplied from the summit at the rate of fifty cubic feet per mile per minute for wastage, and the loss would be 241,920,000 cubic feet per annum, which added to the lockage water, makes 1,278,720,000 cubic feet per annum, and leaves a surplus of 493,894,000 cubic feet, or nearly one fourth of the whole after allowing the boats to pass the locks more rapidly, and the lockage and wastage water to be greater than will be the case, unless the canal should be supplied with double locks.

This calculation is made from the reservoir once full. But supposing the trade to continue eight months, and the rain to fall and be drawn off regularly, the amount used might be three times the full of the reservoir, and consequently its extent would be amply sufficient.

The rain and snow that have fallen in Lebanon during the last seven years, have averaged 40.46 inches, the least being 34.49, and greatest 44.78. But nine inches on an area of eighty miles is sufficient to fill the proposed reservoir, and consequently, if we obtain twenty-six per cent of the smallest amount that has fallen at Lebanon during the last seven years, (and the opinion appears to be general, and perhaps well founded, that there is more rain on the summit than in a lower and more level country,) we shall, with the most active trade, have a surplus of one fourth of the whole amount. But from several years intimate knowledge of the large reservoir on the Union canal, and the country that supplies it with water, and a comparison of the same with the district under consideration, I should anticipate the probable amount collected at two-thirds or perhaps three-fourths of all that falls.

However should this not be considered sufficient, we can command the water from twenty additional square miles on the eastern side of ridge, and being sensible of the prevailing opinion, that a water communication was impracticable, it was thought best to reduce to a certainty the whole of the available resources of the summit, and a level carried over the dividing ridge to Little Toby, from this it was found that by elevating the water one hundred and twenty feet, the whole of Little Toby could be thrown into the summit. The natural flow of this stream, would of itself be sufficient to support an active trade, and by reservoirs the supply increased to any desirable extent. But this I consider altogether unnecessary, and the examination was merely made to remove all doubts from the minds of those who have to decide the question.

The summit level, including the tunnel and reservoir, being unusual

in its arrangement, it may not be improper at the present time to give a description of the plan proposed to suit the exigencies of the case.

It is proposed to construct a canal on a level with the tunnel, (which will not vary materially from $1\frac{1}{4}$ miles in length,) having all the usual arrangements for feeding from the natural flow of the streams, in the same manner as if there was to be no reservoir occupying the same ground, with the exception of having a high tow-path on the hill side, and the outer bank protected from washing by a stone covering.— This being completed, a dam is thrown across the lower end of the valley, raising the water over the whole of this work, so that in high water nothing would be seen except a large artificial lake with a tow-path skirting its margin and locks at each end. The water would be retained in this position by four locks placed near the tunnel and four of similar construction at the dam, all having their bottoms on the same level, and consequently those nearest the reservoir might be used for locks of 20 feet lift, and the others successively 15, 10 and 5 feet lift. According to this arrangement the boats passing through the tunnel will lock up into the reservoir through the 4 locks, each raising it 5 feet in the same manner, as if they were ordinary lift locks with no extra depth of water, and, consequently the expense in each instance is equal to that of a 5 feet lock, (the proposed lift of the locks between the summit and the next supply of water.) As the summit is drawn down, the lift of the first lock is reduced, until at 5 feet from a full height the gates of the first lock are thrown open, in the same manner as those of a guard lock, after the flood has subsided, and the boats pass through without obstruction. The next 5 feet throws another pair of locks open, and so on successively for the third and fourth pair, when the reservoir will be shut out from all connexion with the canal, which will now receive the water from the natural flow of the runs and from lateral reservoirs, should such be found necessary. In case of floods, the surplus water would pass under the canal and deposite its sediment into the body of the reservoir, and as the waters rise successively the locks would come into use, until the reservoir was full, and the surplus water pass off over a waste weir in the dam.

The distance from the dam, at the western end of the reservoir to the Allegheny, (pursuing the proposed line and cutting off by deep cuts and short tunnels 9.10 miles, from the united lengths of Sandy Lick and Red Bank,) will be sixty-five and one half miles, and descent five hundred and eighty-two feet. The distance from the same point, to the West Branch, at the mouth of the Sinnemahoning, will be sixty-two and three fourth miles, and lockage seven hundred and three feet, effected on the West by eighty-three locks, and on the East by one hundred.

To the question, whether there may not be some other route as good or better, than the one proposed? I answer that I think not.

For the first three months, I was constantly in advance of the party, that no point might be omitted which presented the least probability of being important; and of all such, an accurate examination was made

with the instruments, a detail of these would however, be of no interest except to persons in the vicinity. Accompanied by a woodsman as guide, and a security in case of accident in the wilderness, I have traversed the whole country on foot, headed the streams, examined the valleys, and believe that I have a thorough knowledge of all that is important to the present question, from the Clover Patch, on the south, as far north as the summit between the Driftwood, and the Clarion, and consider the proposed route, the one distinctly pointed out by nature, as the main channel of communication between the east and west. South of this there is nothing worthy of notice, by way of comparison. The summits are higher, and supply of water deficient; while on the north, the summit of Elk and West creeks, which alone is worthy of notice, is one hundred and eighty feet higher, the supply of water, at least doubtful, and the expense of construction far greater, as the Clarion is subject to much higher freshets than Sandy Lick, and Red Bank, and consequently requires the construction of very heavy embankments in the bed of the river; since, according to notes taken from point to point, during a reconnoissance, made for the purpose of ascertaining its character, I found about two thirds of the distance from the town of Ridgeway, to the mouth of the Clarion, or sixty-six out of one hundred miles, to be steep bluff, while Sandy Lick shows the reverse of this, or two-thirds of flats. For slack water it is less favorable, as it is larger and as before observed, subject to higher freshets, and the rapid descent of either stream, would make a continuous slack water very expensive, from the great number of dams required. The distance by the two routes, is so nearly the same, that by the course of the streams the Red Bank route would be about four miles longer, but by the line, five miles shorter than the natural course of the Clarion, when taken between the mouth of the Sinnemahoning, and the connexion of the two routes, at the mouth of the Clarion; twenty-two miles of the middle, or Sandy and Red Bank routes being on the Allegheny, and therefore, so much toward the improvement of that river. But when considered with reference to the distance to Pittsburg, the mouth of Red Bank, is twenty-two miles nearer, than the mouth of the Clarion, and an additional thirty-six miles below the Red Bank, along the Allegheny, would complete the connexion to Pittsburg, and therefore open the way not only from Pittsburg and Franklin, to the east, but likewise between these two places. From all these circumstances, I was left in no doubt as to the proper position for the line, and therefore made a minute examination of the one already described.

Having commenced the examination with a full determination of not taking the responsibility of recommending the construction of a canal, unless I could command on the summit, double the amount of water that a close calculation would show to be necessary, and this beyond a doubt, but in such case to report the facts and leave others to draw their own conclusions, without my expressing an opinion, it gives me great satisfaction to state, that my most sanguine anticipations have been more than realized, and that the problem which possessed

double interest from the importance and supposed impracticability of the work, has been fully solved in my own mind, and that an improvement which before the examination, I considered a bare possibility, is now almost reduced to a certainty, and I confidently look forward to the period when large boats will leave the wharf at Philadelphia, and deposit their cargoes at Pittsburg, or lake Erie. It may not be in one, two or ten years, but that every avenue to the west will be crowded, and the remarkable facilities here presented, will be one day improved, is a subject upon which I have no doubts. Although the existing prejudice against reservoirs, for the supply of water, may for a while retard the work; this will gradually wear off, the canal be constructed, support an active trade, make the West Branch canal a good investment, and be used as an example to convince others, that improvements which at first sight appear impracticable, may nevertheless be effected, and the country at large receive the benefit of a thorough water communication from the east to the west.

All of which is respectfully submitted,

B. AYCRIGG,

Principal Engineer, appointed to explore the country between the head of the West Branch improvements, and the town of Franklin, on the Allegheny.



Denny
REPORT

OF THE

CANAL COMMISSIONERS,

WITH THE

ACCOMPANYING DOCUMENTS.

READ IN THE HOUSE OF REPRESENTATIVES, DEC. 7, 1837.

HARRISBURG:

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REPORT

OF THE

CANAL COMMISSIONERS.

CANAL COMMISSIONERS' ROOM, }
December 6th, 1837. }

His Excellency, JOSEPH RITNER,
Governor of Pennsylvania.

SIR:—By order of the board of Canal Commissioners, I transmit to you their annual report, with the accompanying documents.

Very respectfully,

MOSES SULLIVAN,
President.

The Canal Commissioners submit the following Report:—

The duty again devolves on the board of communicating to the Legislature a statement of the operations of the past year, and of the future prospects of the state improvements.

At the period of the last annual report, circumstances existed that fully warranted the board in estimating the probable amount of revenue, from the canals and rail roads of the state, at \$1,300,000. The amount of this estimate has not been realized. During the season many departments of the industry and trade of the Commonwealth received a severe check, from the operations of extraneous causes beyond the power of the state to control, which produced such effects upon her commerce and business that instead of realizing the amount of the estimate, there have only been paid into the Treasury:

Canal tolls,	\$472,261 11
Rail way,	285,504 01
Motive power,	216 585 37

Whole amount,	\$975,350 49
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But exceeding the receipts of last year,	\$137,544 77
Though falling short of the estimate,	324,649 60

The favorable opening of the navigation, its capacity, the general arrangements and the highly creditable exertions of transporters, were far more than adequate to the transaction of an extent of business which would have yielded an amount of revenue equal to the estimate. Had the commerce and various enterprises and branches of industry which are interwoven with the prosperity of the Commonwealth, remained unaffected, the belief is confidently entertained that the revenue would rather have exceeded than fallen short of the estimate. Some company works, so circumstanced as not to be much affected by those extraneous influences, maintained the same progressive and onward prosperity which a healthful policy on the part of the nation would have imparted to all its constituents parts. The Schuylkill and Lehigh companies' works furnish evidence of the truth of the above position.

One aspect of the operations of the year must, however, prove cheering to every Pennsylvanian. While the revenue derived from similar great state improvements, all around us, has materially fallen short of last year, ours has advanced in a ratio corresponding with that of former years. If we can thus maintain our career in the midst of such untoward circumstances, what mind, now, can estimate the effects that will be produced by the return of a more healthy policy. If, in connexion with this view of the subject, the completion of the improvements now in progress, and which will effectually bring into use the immense mineral productions of the Lykens valley, Shamokin, Mahanoy, Wyoming, and the bituminous coal and iron fields of the West Branch and Juniata, be also contemplated, the result is incalculable. But little coal now passes on the canals of the Susquehanna, its branches and the Juniata. When, however, the improvements in progress to complete the original design of those works, begin to unfold their destined utility, the addition to the already increasing revenue, derived from those sources, will be immense. As evidence of this it is only necessary to notice the rich return which the mining operations in the Schuylkill coal fields impart to the Schuylkill navigation company's works. This improvement is only 108 miles in length, and has produced tolls the present season amounting to \$569,141 50, up to the 13th of November.

When the improvement of the State, by rail roads and canals, was commenced, but little was known of the extent of her coal and iron deposits, and but few suspected that they would ever assume the importance they have attained. The grand object then was to accommodate commercial intercourse between the metropolis and the Ohio river and the lakes, and to improve the means of internal communication for the agriculturist and manufacturer. To this end the main line of canal and the North and West Branches were urged.

That the main line has proved eminently successful in accomplishing that superiority which the projectors of the system contemplated, in becoming the chief channel of communication through which the merchandize of the atlantic sea board will pass to the consumer of the west, is abundantly proved by the fact, that while the revenue derived from the State works of Pennsylvania advanced fully

16 per cent. during the year, the revenue from similar works in adjoining states declined in the same ratio.

The agency of steam and the unparalleled growth and prosperity of those extensive sections of country, west and east of the State, have produced an astonishing amount of travel. Rail roads are best adapted to facilitate the transit of persons; and, when the Gettysburg extension of the Pennsylvania rail way is carried on to connect with the Baltimore and Ohio rail road, the state may then also justly claim her full share of that kind of business upon her works.

The commanding nature of the position of Pennsylvania in relation to the trade and commerce of the west by canal and rail way, is demonstrated by the events of the past season. But even this falls far short of the advantages to be derived from the mineral wealth of her own interior. Certainly, when we look at the events that have transpired elsewhere, the developments attending our mineral resources will form by far the most bold and striking characteristic connected with the operations of the system.

The consumption of coal in Great Britain, amounts annually, to about 18,000,000 tons, being a ton to an individual. There are supposed to be manufactured within the same territorial limits 1,000,000 tons of different kinds of castings and iron. Coal there is an article of general consumption for domestic and manufacturing purposes. The forests have long since given way to the hand of the agriculturist. Iron for some years past, has supplied the place of wood in the construction of bridges, rail roads, and many works of the mechanic arts. To produce this vast amount of iron there was no kind of fuel employed except bituminous coal, until recently in Wales, where experiments have been carried so far, as to result in the manufacture of iron with entire success, with no other kind of fuel than anthracite coal.

That the process used in the manufacture of iron, in Great Britain, will be applied to the same purpose in Pennsylvania, developments already made in Schuylkill, Fayette, Huntingdon, Lycoming, and Centre counties, give the most flattering assurances.

Coal and iron-ore are minerals quite as abundant within the borders of Pennsylvania, as in Great Britain, and will, at a period nearly present, become the great staples of the State. The internal consumption of coal in Great Britain, is about one ton to an individual. Assuming this proportion, and taking a view of the mass of population, that will be employed, at home, in mining, and supplied abroad with the mineral, by means of our improvements connecting with the northern lakes, and the Atlantic sea-board, an estimate may be formed of the destined coal business of Pennsylvania.

The progress of civilization and the improvements in the construction of rail roads and canals, and the arts and manufactories generally, to which the other great staple, (iron) is adapted, throughout the same extent of country to be supplied with coal, will always cause an equal demand for it. That a few years will disclose such a state of things, under which, Pennsylvania, by pursuing a wise policy, can bring an immense tonnage of coal and iron upon her public works,

and supply not only her own demand for iron, but a large proportion of that which exists elsewhere, and which is now supplied by Great Britain, we are confident in the belief.

But a few of the coal and iron fields of Pennsylvania, have as yet been effectually reached. It is true that the Schuylkill navigation company's works penetrate the Schuylkill field. Those of the Lehigh have arrived at that of Mauch Chunk and Beaver Meadow. The Lackawanna rail way reaches the region of the same name and is connected with the Delaware and Hudson canal. But there remains yet to be opened effectually the Lyken's valley, the Shamokin and Mahanoy, and the Wyoming beds, and the coal and iron along the whole range of the Alleghenies and their base. The Wyoming bed is here included, because, though it is now reached by the North Branch canal, its real market lies to the north.

Upon all these, a powerful influence will be exerted by the Columbia and tide canal, which is progressing rapidly, and is expected to be completed and ready for use on the first day of May, 1839. This canal will furnish an outlet to the Chesapeake and Delaware bays, not only for the fields in question, but the products of the whole Susquehanna country. Since it is not in the hands of the State, as it should be, being one of the great outlets of her system, true policy dictates that she should take early means to profit by its completion, by giving her remote mountains and valleys an opportunity of enriching themselves by its means. The Lyken's valley coal field is connected with the east side of the river Susquehanna, by rail road. The Susquehanna division of the Pennsylvania canal is on the west side. Without some improvement at this point, the State must forever be deprived of a large amount of tonnage. The construction of about eight miles of canal, from the mouth of the Wisconsin to the head of the pool of Clarke's Ferry dam, will be all that is necessary to bring into successful requisition, the whole of the western region of the Schuylkill coal and iron field.

Though the board would mainly direct attention to the grand and leading features of the system, yet incomplete, namely, the North Branch extension, Erie extension, and Gettysburg extension of the Pennsylvania rail way, and would recommend that to these, the energies of the State should be first confined, with the view of bringing them into active usefulness, and of making them assist in the construction of others as soon as possible; yet it is deemed proper also to recommend the construction of a canal by the State from the Wisconsin to the head of Clarke's Ferry dam.

This measure is recommended, not only as a matter of policy, as regards revenue, but of convenience in the management of the public works. Experience proves that it is decidedly impolitic, as regards revenue and management, to have improvements by companies, located nearly parallel with the State works, and connected with them at different points. Of this character is the Harrisburg, Portsmouth and Lancaster rail road. Its prosperity mainly depends upon the abstraction of trade and travel from the State works. It is an independent link in a chain of improvement, and gives rise to collisions

adverse to the general interest. Of a character entirely different is the Cumberland valley rail road, Williamsport and Elmira rail road, and the Bald Eagle navigation. They connect regions remote from the State improvements with them.

To operate upon a continuous line of rail way with entire success it ought, as a whole, to be subject to the same regulations throughout. Entertaining this opinion, and with the view of having the commercial metropolis and the seat of government connected by a continuous line of rail way, under the same regulations, and, also, of filling up a link in a chain of rail way communication between the seat of government of this State, and that of the General Government, the board, are also, of opinion, that the State will yet find it necessary to construct a rail way from Harrisburg, to connect with the Philadelphia and Columbia rail road at Columbia.

Before closing this branch of the report, the board would, most respectfully urge upon the attention of the Legislature, the manifest necessity which exists for directing the whole resources of the State to the objects they have specified. The system ought to be carried out agreeably to the design laid down by the Legislature of 1825-6, and completed as soon as possible. Any other course of policy will prove a waste of energy and produce no valuable results.

As the coal and iron business comes to be properly appreciated and extends itself, improvements other than those specified, with the view of bringing into active operation important interests and sections, in addition to the improvements already made, ought to be constructed. Among these the gradual extension of the West Branch, so as to connect with the waters of the Allegheny, the extension of the Wisconsin canal, so as to embrace the Shamokin and Mahanoy region, and the improvement of the Raystown branch of the Juniata might be enumerated.

But these improvements ought only to claim attention after the three grand leading features of the system, at present engaged in, are completed, and at such times as the resources of the State will warrant.

In relation to the ultimate success and prosperity of the public works, the board have expressed a decided opinion. The revenue derived from the public works is already beginning to have a decided effect upon the fiscal operations of the government, and will hereafter be the main reliance of the State.

What amount of revenue will be derived from the public works the present fiscal year, it is difficult, under existing circumstances, to determine. But the board feel warranted in giving the assurance that even if the present pressure continues, it cannot fall short of \$1,200,000. The regular progressive increase, under the most favorable circumstances, will bring it, beyond a doubt, up to \$1,400,000.

As a proof that the above is not an over estimate, and that the whole system, when perfected, will amply remunerate the State for her outlay, and reward the patience of her citizens; it may be mentioned, that the main line of canal and rail way from Philadelphia to Pittsburg, which cost about \$12,358,000, has yielded, during the

past season, about three per cent. on its cost, besides defraying all expenses for repairs, supervision, &c. The Philadelphia and Columbia rail road, alone, yielded full interest, not only on its cost, but on the sum invested in locomotives, besides keeping itself in repair. The Delaware division of canal has, also, maintained itself in repairs and paid within a small fraction of five per cent on its cost. There is, therefore, no doubt, but that when the now unproductive branches are completed, and sustain themselves, as they assuredly will, the whole system will not only support itself, but pay a handsome revenue to the State.

The board will now proceed to detail the operations on, and condition of, each division of the public works:

DELAWARE DIVISION.

The use of this division, has been nearly unembarrassed during the season, as will be seen by reference to statement 1, which will also show the condition of all the divisions of the public works.

There have been paid into the Treasury, during the fiscal year, tolls to the amount of \$90,150 50. Cost of repairs during the corresponding period, \$28,530 00. These repairs are expensive; much of the material used in the construction of the division, having been perishable. A number of the lock-gates were renewed the past season, and the superstructures of twenty bridges reconstructed. Materials have been also prepared for renewing the gates of 13 additional locks, and the superstructure of 3 aqueducts; all which will be accomplished before navigation is resumed next spring.

Experience shows, that a large proportion of the wooden structures connected with the canal, require renewing every 7 or 8 years. This division is now undergoing the first general renovation of this kind, and after the repairs contemplated to be done next season are completed, there will be a considerable diminution in this kind of expenditure for some years to come.

The board in their last annual report, adverted to the necessity "at no distant period, of increasing the capacity of this division." The events of the past season strengthen the position then taken, and show that no time ought to be lost in accomplishing this object. John P. Baily, chief engineer, in charge of the division, was directed by the board to make an examination with a view to this change, and report upon its expense and practicability. This result will be found in the documentary part of this report.

The board would respectfully urge the Legislature, to make provision for the commencement of the construction of the additional locks next season, along side of the present ones, of dimensions corresponding with those on the Lehigh. The capacity of that company's locks is adapted to boats of 100 tons. The mining operations of the Mauch Chunk, Beaver Meadow, and other companies, will depend for an outlet to market, on the Delaware division. And the rising importance of and increasing demand for coal and iron, require that the locks should be doubled; and if doubled, sound policy dictates

that it ought to be done in a manner that would form a hundred ton navigation from the metropolis of the state, towards the sources of the Lehigh.

PHILADELPHIA AND COLUMBIA RAIL ROAD.

MOTIVE POWER DEPARTMENT.

Operations on this important improvement, which connects the commercial metropolis of the state, with the eastern termination of her canal, have been conducted in all their departments the past season with entire success. The approximation to perfection, which the construction of locomotive engines, and the economy and system in their use, has reached, is adding proof daily, that the opinions heretofore expressed in relation to the use of mechanical as a motive power, were well grounded.

One engine on the Philadelphia and Columbia rail road, during the past season, made 175 successive trips of 77 miles each, with the regularity of the return of day. As an instance of extraordinary performance, it is proper to state, that some of the engines have drawn a gross weight of 190 tons, over the road, within the usual time for performing a trip.

The capacity of the central shop at Parkesburg, has been enlarged, by the erection of wings, at its eastern and western sides, for the protection of locomotives, when not in use. Great advantages also result to the Commonwealth, from having all the repairs to the engines done at this point. There are 33 locomotive engines, of the heavier class on the road. This number is deemed sufficient for the business of next season; and it will not therefore be necessary to ask the Legislature to make provision for purchasing an additional number. There are also seven of a lighter class not suited to the road, which it is contemplated to place on the short levels of the Portage rail road, to which they are better adapted. The board are truly gratified, in being enabled to state that the motive power fund, it is believed, will hereafter be strong enough to furnish all the locomotives necessary, on the Philadelphia and Columbia rail road, and recommend the passage of a law to that effect. This may safely be done, inasmuch as the motive power department is now placed upon a substantial basis. It is fully adequate to all the general and transient business of the road, and, with the continuance of a proper system in its use, will probably yield a surplus, besides defraying all expenses, equal to the amount hereafter necessary for the purchase of engines.

Motive power tolls, year ending October 31, 1837,	\$137,338 67
Expenditure, “ “ “	\$114,859 76½
Excess above expenditure,	<u>\$22,478 90½</u>

For further particulars, the Legislature are referred to the accompanying report of the Superintendent of motive power.

REPAIRS DEPARTMENT.

The masonry of all the bridges, which required it, have been supported by buttress walls, and their wooden superstructures have been strengthened. They are consequently in good condition, and will bear the increased weight of the heavier locomotives now used.

In the construction of the road, there were three kinds of rails used: the iron edge rail, the wooden rail, plated with iron, and the continuous stone sill, or curb, plated with iron. The part of the road on which the edge rail is used, is unimpaired. The balance, which consists of 22 miles, next to Philadelphia, of the northern track requires to be renewed. The part of these 22 miles, which is a continuous curb plated with iron, (about six miles,) has become extremely rough and undulating; and the wooden rail used on the remainder is very much decayed. This is a fruitful source of injury to cars and engines, and ought, in the opinion of the board, to be remedied, by relaying the whole length with the iron edge rail, the next season.

A wooden superstructure, or bridge, was placed across a ravine at Maul's, which cannot be used with safety, any longer than next season. An embankment can be advantageously substituted, which will render this part of the road permanently substantial, and is accordingly recommended.

Estimated cost of laying 22 miles of track with edge rail,	\$175,000
Estimated cost of embankment at Maul's,	<u>6,500</u>

It is gratifying to the board to be able to communicate to the Legislature that operations were carried on upon the Schuylkill inclined plane, without any serious accident or loss of property, the whole season. Business upon it was not, it is true, much increased; but it was sufficiently extensive to give abundant proof that the capacity of the plane is fully adequate to a much enlarged amount of trade and travel, and that its safety may be relied on. Consequently, it is the decided opinion of the board, that the State ought not, under existing circumstances, to attempt to relinquish a work that has been constructed at great expense, and which evidently now answers every purpose. When this plane was first put in operation, it was a cause of delay, loss of life and property; but the experience since acquired in its use, renders it at this time entirely safe.

Amount of rail road tolls paid into the treasury, year	
ending Oct. 1, 1837,	\$216,227 71
Cost of repairs same period,	<u>61,553 22</u>

LINE OF RAILWAY TO AVOID COLUMBIA PLANE.

This improvement would have been completed, as suggested in the last annual report, if the necessary means for carrying on the work had been provided by the last Legislature. It has been prosecuted by the contractors to an extent beyond the appropriations.— Notice was given to them on the first day of May last, that the funds

were exhausted. But it appears, rather than undergo the derangement, loss and difficulty incident to a temporary abandonment of the work, they have continued their operations. In taking this step they relied solely upon the liberality and steadfastness of the Legislature, and knowing that the work was undertaken with the view of completing it without delay. The amount of work done beyond the appropriation is \$23,332 00. Justice would seem to require that measures ought to be taken by the Legislature, without delay, to provide means for the payment of the estimates due, and to enable the work to be prosecuted with an energy that will warrant its entire completion the early part of next season.

Estimated cost of the work,	\$130,000
Appropriation by resolution June 6, 1836,	25,000
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Sum required to complete,	<u>\$105,000</u>

EASTERN DIVISION.

There has been but little interruption in the use of this division from breaches, &c. The greatest difficulty was that experienced by the heaviest class of boats, during the latter part of September, and caused by the low state of the water in the Susquehanna. The dam at Clarke's Ferry is imperfect, and when the water becomes low, a very great proportion of it passes through the apertures in it. The level of the canal adjoining the dam was excavated deeper during the last winter, but not sufficiently so to accomplish the whole object. Something more effectual must be done during the winter and the next season to insure an abundant supply of water. The board have viewed this subject with great solicitude. The whole sheet of the Susquehanna may be commanded, and only wants a proper obstruction, and capacity of canal at the entrance to secure a supply at all times.

After mature deliberation, it has been thought best to excavate the whole of the level next the dam, which is about two miles long, 18 inches deeper.

In the last annual report, the propriety of doubling the locks on this division was urged. The events of every day add force to the recommendation. And the want of capacity at the inlet is an additional reason for doubling the locks of the first level without delay. In addition to this, it is proposed to repair the dam along its whole length. These measures the board believe will contribute a perfect remedy against future scarcity of water and will cost, agreeably to the Engineer's estimate :

Cost of doubling three locks, and sinking the level 18 inches,	24,402 40
Cost of repairing the dam,	21,868 00
	<hr/>
Total cost of the work,	<u>\$46,270 40</u>

But the whole of the locks on this division from Clarke's Ferry to Columbia will soon require to be doubled. The condition of some of them is very defective; sound policy would seem to require that at all such places, new ones should be constructed along side of the present locks, as soon as practicable. This will be the best method of repair, beside making increased provision for the vast business which must soon pour its treasures on this division.

The Bridge at Duncan's Island was let March 4th, 1837, to Messrs. Updegroves and Holman. They have thus far sustained the high opinion formed of them as mechanics and contractors. The work has been prosecuted with great energy, and it is expected will be ready for use at the opening of navigation next spring. All the masonry is now complete, and four spans of the superstructure have been raised. The bridge is located on the site of the old one. The reasons which led to a determination on this point, different from what was contemplated at the date of the last annual report, are these: At that time the old bridge was standing and was expected to be used during the past season, while the new one was in progress. But in this the board was disappointed. Two of its spans were removed by the spring freshets. On minute examination, the deposits of sand (so annoying at present at the outlet lock and which it was thought would be obviated by constructing the bridge and outlet higher up) were found to continue along the shore some distance.— Hence the main object in proposing to locate the bridge further up stream was found to be defeated, and the other, viz: that of taking boats, in crossing, more out of the force of the current near the breast of the dam, was not deemed sufficient to warrant the additioned expenditure of \$31,813 00: That being the saving effected by retaining the old abutments and avoiding a change of the outlet-lock and a portion of the canal.

The new bridge will be a noble structure, combining strength and durability, with all the requisites for towing boats and accommodating the ordinary business of the country.

Estimated cost of bridge,	80,000 00
Amount paid contractors,	36,687 62
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Amount required to complete,	\$43,312 38
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By reference to the report of John P. Bailey, engineer, a more particular detail relative to the bridge may be seen.

JUNIATA DIVISION.

The supply of water has been abundant and the navigation good all season. There has been little interruption arising from breaches. One of the greatest magnitude of any that occurred during the season, took place on the 9th of October, and with unceasing exertions the water was re-admitted on the 16th.

The mason work on this division is generally of a permanent character; and the canal banks give evidence of increasing solidity.

The repairs are of an ordinary kind and arise from the decay of material used in the construction of locks, aqueducts, bridges, waste ways &c., and the effects of the currents upon the dams.

If the dams resist the action of the spring freshets, no repairs of an extraordinary nature will be required next season, except on the Juniata aqueduct, the under works of which are decayed.

There has been drawn from the Treasury, and expended in repairs on this and the Eastern division, embracing the whole line from Hollidaysburg to Columbia, from the 31st of October, 1836, to the 31st October, 1837,

78,060 95

Tolls derived from same, corresponding period,

215,867 50

It is proper to remark that the expense of repairs on these divisions, was much increased, in consequence of the failure of Clarke's Ferry bridge, last spring, sustaining horse-power, and hands to ferry the boats, and finally a steam tow boat, was very expensive and was necessarily borne out of the repair fund.

PORTAGE RAIL WAY.

MOTIVE POWER.

Operations connected with this important part of the public works have been carried on the past season, with entire satisfaction, it is believed, to the travelling and transporting public. The board are gratified in stating that not a single accident of a serious nature, in consequence of the neglect of agents, or deficiency of any part of the road, occurred during the whole season; and that however complicated this improvement necessarily is, the transit of persons and property can be accomplished over the inclined planes with entire safety and success.

Locomotive engines were placed on the levels next to Johnstown and Hollidaysburg, as was contemplated at the date of the last annual report, and have been found to answer a valuable purpose. In consequence of the low price of fuel, mechanical power is found much more economical than animal power, besides being more certain and expeditious. The valuable effects that have resulted from the adoption of engines, induce the board to recommend an extension of their use. They can be applied advantageously on the sections of road between all the inclined planes, except two. When this is done, the passage over the mountain can be performed in less time. To accomplish this object, six engines in addition to the present number, will be required. As some of the engines on the Philadelphia and Columbia rail road, are not well adapted to long lines of road, it is proposed to remove them to this road, to supply its wants. Two engines are now employed on the level next to Johnstown, eight between the head of inclined plane No. 1, and the foot of plane No. 2; and two on the level next to Hollidaysburg. The locomotive depot at Hollidaysburg, has been placed under contract, as contemplated by the act of

last session and is nearly completed this fall. Its whole cost including the necessary rail-ways and turning platforms, is

estimated at	\$4,300 00
Amount of the appropriation,	3,065 00

Amount necessary to complete,	<u>1,235 00</u>
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To make these depots and machine shops available and useful to the Commonwealth, they ought to be stocked with implements, &c. Of the propriety of this with the view of having all the repairs done on the road, the Parkesburg shop on the Philadelphia and Columbia rail road, gives full proof; for this object an appropriation of \$5000 will be necessary.

It is believed that covering the inclined planes would be highly advantageous. Cost of roofing one plane is estimated at \$3,500, which is recommended as an experiment.

The motive power tolls, from the 21st March, to	
the 31st October, 1837, were, Johnstown,	\$29,183 58
“ “ Hollidaysburg,	39,834 77

Whole amount,	\$69,018 35
Motive power expenses, same period,	58,592 14

Excess of tolls above expenditure,	<u>\$10,426 21</u>
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REPAIRS.

The expenses for repairs have been heavy and much greater than that of last year, caused principally by the preparations made for the more extensive use of locomotive engines. To use them in a proper manner, sidelings and turning platforms became necessary. Supplies of water in some instances were not permanent. At planes No. 1, 5, 6, and 10, 5,900 feet of pipe have been laid the past season, from permanent springs, affording regular supplies of good water for the stationary and locomotive engines. The road is now in good condition, with the exception of parts, upon which the wooden rail plated with iron was used instead of the iron edge rail. A portion of this has been taken up and laid with the edge rail the past season. The balance will require a similar change next season. A number of pine cross ties were used on various parts of the road which are decayed, and for which locust is substituted.

There have been paid into the Treasury during the fiscal	
year, tolls to the amount of	\$69,276 50
Repairs, during the corresponding period,	<u>40,263 25</u>

WESTERN DIVISION.

After full examination, it was deemed most conducive to the interests of the Commonwealth, to make a cut around the abutment of the Blairsville bridge, at Bairdstown: Accordingly, agreeably to the provisions of the first section of the act passed April 3d, 1837, the work was placed under contract by a letting at Blairsville on the 14th day of July last. It will be completed and ready for use at the opening of the navigation next spring. The whole cost will be \$5,016 00.

Navigation closed on the upper part of this division on the 27th day of November, and opened on the 27th day of March. It closed on the lower part of the division on the 3d day of December, and opened on the 20th day of March. The supply of water has been abundant all season. The principal obstruction arose from breaches and hill-slips. The general condition of this division is not good. The original mechanical work in the construction of the locks is very imperfect. Locks No. 6, 14 and 26 were rebuilt before navigation opened in the spring. Locks No. 3, 7, 13 and 14 will have to be rebuilt in whole or in part. Four aqueducts upon the upper part of the division, and the aqueducts across Buffaloe, Deer and Bull creeks, and some of the bottom timbers of the aqueduct across the Allegheny at Pittsburg, must be renewed, all before the opening of navigation next spring. Materials have been prepared for these repairs; but a large amount of labor will also have to be performed in order to put this division in a condition to be relied upon with safety the next season.

There has been paid into the treasury during the fiscal	
year, tolls to the amount of	\$132,523 49
Repairs during the corresponding period,	<u>67,087 56</u>

SUSQUEHANNA, NORTH AND WEST BRANCH DIVISIONS.

SUSQUEHANNA DIVISION.

Navigation on the Susquehanna division experienced some interruption, arising from breaches caused by sudden and heavy rains, and from the low state of the water in the canal, caused by the imperfect condition of the dam at Northumberland. In the construction of this dam the usual plan was pursued, that of a frame filled with stone, after which the upper slope of the dam was riprapped with stone its whole length, and to the width of about 60 feet. The stones used were large, and gravelled on the top. This gravelling is invariable abraded by the ice freshets in the spring, and consequently when the low stages of water occur, it all finds its way through the riprapping. This will continue to take place as long as gravelling the upper area of the dam is relied on.

The board are of opinion that a more permanent remedy ought to be adopted next season, and concur with the engineer, Jas. D. Harris, in the plan recommended, of placing an intermediate and perfectly

tight stratum between the wier and riprapping. The foundation of the dam is rock, consequently the only object to be attained is that of rendering the dam tight, to which the plan will prove efficacious.

Estimated cost of this work,

\$38,400 00

That the expenditure of this sum will render the structure permanent, and sufficiently tight to afford an abundant supply of water, the board entertain no doubt. Without such expenditure a recurrence of low water will always take place; with it an abundant supply can be had.

NORTH BRANCH DIVISION.

The navigation of the North Branch division, so far as it depends upon the Nanticoke dam, was subject to the same difficulty experienced on the Susquehanna division. The cause was the same and a similar remedy must be applied. Estimated cost, \$5,000 00. The condition of this division is not good: wood only was used in the original construction of locks, which are now in a rapid state of decay. The board would recommend the construction of locks of a permanent character to be commenced next season.

The guard lock at the Nanticoke dam is situated one-eighth of a mile below the dam, in consequence of which the canal between the lock and the entrance at the dam was filled up with sand last spring. To obviate this difficulty a new guard lock, located opposite the dam, will be indispensable. The location of the canal, in some places, is so low that the water forces its way over the canal bank from the river, and causes a current in the canal very injurious to the banks, and causing troublesome deposits. It is proposed to construct two extra grand locks between Nanticoke and Beach Grove, at proper points, with the view of regulating the amount of the water during freshets. If these improvements were made the condition of the North Branch division would be rendered sound and permanent.

That part of the North Branch division comprised between the Nanticoke dam and Northumberland, (51 miles) is supplied from the Nanticoke dam. When the improvements upon this branch shall be completed to the New York state line, and the business become more active; doubts are entertained whether this length of canal can be supplied fully from the Nanticoke dam. The proper engineer was, therefore, directed to make an examination in relation to the best means of creating a supply when needed, which resulted in recommending the introduction of Fishing creek. In this the board concur, and would, respectfully, urge upon the Legislature the propriety of conferring the proper authority to have the feeder located, with a view to prevent any further improvements upon it by individuals, under the impression that it will never be required by the State.— This course may prevent additional expense in the item of damages.

WEST BRANCH DIVISION.

The mason work on the West Branch division appears very permanent. Breaches were of frequent occurrence a part of the last

season. The river bottoms, through which the canal is principally located, is alluvial, and the soil does not resist very well the protracted action of the water. From the opening of the navigation, up to the 4th of July, its condition was very favorable; from that time a succession of failures took place from breaches and otherwise, at short intervals, which seriously interrupted its navigation the remainder of the season. Parts of this division have only been in use a few years, and are, therefore, more liable to breaches than older works, but by the exercise of care in strengthening the banks, where needed, with the right kind of material, and cribbing the dams, as it becomes necessary, the whole division will, before many years, acquire the usual permanency.

There has been paid into the Treasury during the fiscal year, from those three divisions, tolls to the amount of	\$31,835 07
Repairs during the corresponding period,	<u>41,798 85</u>

TANGASCOOTACK EXTENSION.

This extension has not been completed in consequence of the failure of the appropriations last session. It is, however, navigable as high as lock No. 2, and can be completed during the early part of next season. Lock No. 2, the guard lock and dam No. 2, are incomplete. All the work is in such a state of forwardness as not to be injured by the winter or spring freshets.

Estimated amount of work done,		\$175,614 00
do. do. to be done,		<u>50,211 24</u>
Estimated cost,		\$225,825 24
Appropriation, April 13, 1835,	\$80,000 00	
do. Feb. 18, 1836,	<u>112,017 00</u>	
		<u>192,017 00</u>
Appropriation yet required,		<u><u>\$33,808 24</u></u>

BEAVER DIVISION.

This portion of the State canals having suffered so much from the floods in 1835, and of the succeeding years, that although much has been expended in the way of ordinary repairs to prevent the expensive parts from destruction, yet, for substantial and durable repairs, it was evident that a sum too large to be taken from the repair fund, would be necessary, and, therefore, with a view of laying this subject before the Legislature, the board directed the engineer of the line to make an estimate of repairs necessary to put this division into complete order. The amount, (\$48,892) together with explanations, will be found in the report of C. T. Whippo. It will be seen that the engineer suggests, and the board concur with him, that these extraordinary repairs ought to be made in time for this canal to be ready

to receive the trade of the Ohio and Pennsylvania canal, which it is expected will be finished in the course of two years, and within which period it may be expected the line of the Shenango extension, now under contract, will be finished, and add its share of business to the Beaver division.

Expended in repairs, year ending Oct. 31, 1837,	\$27,000 00
Tolls corresponding period,	<u><u>1,667 18</u></u>

FRENCH CREEK DIVISION AND FEEDER.

Injuries from similar causes, but to a much greater extent than those on the Beaver, have occurred on this division, and with the same views as governed the board in that case, they directed the engineer to make estimates of the cost of putting this line into a state of complete repair. By the report, it will be seen, that for the French creek alone it will require \$76,052, and for repairing the feeder, the least amount would be \$86,403. From these facts it is at once evident that the ordinary repair fund could not bear such expenses.—They would abstract so much from the main lines as to leave them destitute of the means for the most moderate repairs.

This line from its large proportion of slackwater and lowness and extensiveness of the adjacent flats, has caused much more injury to private property than any other work, of equal extent, belonging to the State; and, if reliance is placed on the opinions of many persons in that country, the obstructions, especially to the natural descending navigation, more than counterbalance any advantage hitherto afforded by the artificial channel: Indeed, it would seem that its unproductiveness and inutility must remain, until it become in some way connected with a main line of improvement. Whether the works on this and the Beaver line could have been so constructed as better to have resisted the action of the elements is a question not immediately connected with the present consideration. It would seem, however, from past experience, that dams on the deep gravelly bottoms of those powerful streams, could not, in the first instance, be permanently constructed, without immense expense. The best remedy at present used, is, after the water has excavated a deep chasm below the dam, to place along its whole extent strong crib work filled with stone, and connected by spars or sheeting with the main dam.

The board can only express their regret that so large an amount of repairs will be absolutely necessary before these lines will be prepared for an active navigation. They have thought it their duty to lay the whole of the facts and circumstances before the legislature, that they may be enabled to exercise their discretion on the subject.

Amount drawn from Treasury, for repairs, year	
ending October 31, 1837,	\$19,397 00
Tolls, corresponding period,	<u><u>\$1,078 81</u></u>

EXTENSIONS.

TIOGA LINE NORTH BRANCH.

This important line was placed under contract on the 25th day of October, 1836. The competition for the work was very great. It was taken at low prices, and at a time that was succeeded by such a scarcity of provisions that many abandonments and consequent relettings took place. Notwithstanding this the work has been prosecuted with an energy fully commensurate with the available means. Sections 5, 6, 7, and 31, are completed. Sections 33 and 41, want nothing except trimming. Sections 8, 9, 13, 14, 15, 16, 18, 39, and 42, are nearly complete. The mechanical work has been progressing steadily, though with less activity than the sections. The necessity to urge forward some of the wooden structures is not so great, as they are liable to decay, while the banks would be improving in solidity. Some progress has been made in every department of the work.

The board visited these works, and the country through which they pass, the past season. The plan and prosecution of the work bespeaks for itself permanency. That it ought to be constructed in a permanent manner and urged forward with energy, no one can be insensible who is acquainted with the fact that a large and prosperous population destitute of coal lie to the north, and large beds of anthracite coal to the south of the improvement. The whole distance to be completed is 89 miles and 14 chains. The part under contract is 35 miles, leaving 54 miles and 14 chains to be placed under contract.—In the opinion of the board, the remainder ought to be definitely located, and the most difficult parts of it placed under contract the next season. To these objects an appropriation of \$500,000, is recommended.

Estimated cost of 35 miles under contract,	\$1,274,489 68
Appropriated by act February 18th, 1836, \$150,000	
Proportion of temporary loan authorized	
June 16, 1836,	100,000
	<hr/>
	250,000 00
	<hr/>
Amount required to complete	<u>\$1,024,489 68</u>

ERIE EXTENSION.

The progress and condition of the work put under contract on this extension, are fully set forth in the reports of the Engineer and Superintendent, to which the board respectfully refers.

In the report to the last session of the legislature, the importance of the speedy completion of the canal to the harbor at Erie was urged, and a liberal appropriation recommended. An appropriation not having been made, no further work could be put under contract. The board now repeat the opinion, that the best interests of the state require the speedy completion of this extension, and without entering

into arguments which have been so frequent and so conclusive, would most earnestly and respectfully urge upon the Legislature the propriety of making the appropriation recommended.

An appropriation not having been made, the question of preference between the eastern and western routes, north of Conneaut lake, has not been determined. If the Legislature shall see proper to provide means for this extension, and at the same time designate the route, the question will be settled, which mode the board would naturally prefer, as relieving them from an embarrassing responsibility; but should it be deemed fit merely to provide for extending, without designating the route, the board will feel it to be their duty to decide as promptly as the importance of the subject will permit.

As some parts of the work, on either of the routes, will require much more time for completion than others, it is respectfully recommended that the board be authorized to put such parts under contract next season. These objects will require \$500,000.

Estimated cost of 45½ miles, Shenango line:

Erie extension under contract,	\$987,723 34
Appropriated by act February 18, 1836. 200,000	
Proportion of temporary loan authorized	
June 16, 1836,	100,000
	<hr/>
	300,000 00
	<hr/>
Amount required to complete,	\$687,723 34
	<hr/>

GETTYSBURG EXTENSION PENNSYLVANIA RAIL WAY.

The board, during the past season, examined this extension, and were highly gratified with the progress and promising appearance of the work. This improvement cannot fail to be useful to the State, connecting, as it will, the city of Philadelphia with the Ohio river at Pittsburg and Wheeling, and with the extensive Cumberland valley south of the Potomac; and rendering more than one hundred and fifty miles of the Baltimore and Ohio rail road auxiliary to that great object, without any cost to Pennsylvania.

The work has been, and still is, prosecuted with great vigour. More than eleven miles of the twenty-two and a half miles under contract is already graded, and considerable work done on the remaining eleven and one half miles. It is judicious and advantageously located, and from the nature of the ground, and material which form the bed of the road, it will be of the most permanent character. Some parts of the work are heavy; but when finished it will require so little repairs, as to make it upon the whole, less expensive than some other works, the original cost of which is much lighter.

All the heavy sections between that already let and the contemplated junction with the Baltimore and Ohio rail way, should be put under contract early next summer, so as to be finished simultaneously

with that now in progress. Three hundred and fifty thousand dollars will be necessary to accomplish this object, and complete that already under contract.

Estimated cost of grading the 22½ miles under contract, \$478,079 99
Appropriated by act of 18th February, 1836, 200,000 00

Sum necessary to complete,	<u>\$278,079 99</u>
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Before closing this branch of the report, it is proper to observe that the appropriations to the Gettysburg extension and North Branch extension are at this time entirely exhausted, and to the Erie extension nearly so; and to bring to the view of the Legislature the urgent necessity, in relation to economy and justice, of making provision early for carrying on these works. On two of them the work has been prosecuted beyond the limit of the means, although the contractors were informed that the appropriations were exhausted. They, however, continued to prosecute their work, rather than suffer the loss which a cessation would occasion.

RESERVOIRS.

At the date of the last annual report, surveys with the view of avoiding the inclined planes on the Portage rail way, were in progress, which, it was thought, would have a bearing upon the question of constructing reservoirs on the east and west side of the Allegheny mountain. Those surveys have since been brought to a close, and as they do not change the termination of the rail way, the subject remains as heretofore.

During the two last seasons the supply of water at Hollidaysburg and Johnstown was sufficient, but it is apprehended that in some seasons there may, for a short period, be a deficiency at these points. With a view of providing a remedy, the board intend to refer the matter to an Engineer, and also to give those points their personal examination, so as to be able to determine upon the most eligible plan to be adopted.

EXPLORATORY SURVEYS.

Agreeably to the provisions of the 12th section of an act passed April 1st, 1837, John P. Baily engineer, was directed to cause a survey to be made from a point on the Philadelphia and Columbia rail road, at Downingtown, to a point on the Philadelphia and Wilmington rail road, at Chester. Towards the close of the season the country was traced over and minutely examined. The road way formation, upon a location adapted to proper grades and moderate curvature, was found very expensive. The line diverges from the Philadelphia and Columbia rail road, 33½ miles from its eastern termination, and is 23 miles to Chester, and 12½ miles from Chester to Philadelphia. The report of the engineer, which contains an estimate of the cost, will accompany this report.

Doubts having existed, whether the survey made by H. R. Campbell, was in strict accordance with the provisions of the resolution

passed June 16th, 1836, as he was not at the time a state Engineer, John P. Bailey was also directed on the 9th of November last, to make a survey of the west Philadelphia Rail road, and ascertain the practicability of connecting it with the Pennsylvania rail road, at the foot of the Schuylkill inclined plane. His report will also be found in the accompanying part of this report.

The board was also directed by the 49th section of an act passed April 1st, 1837, to cause surveys to be made of Penn's creek, and its valley, with the view of ascertaining the practicability of constructing a canal and rail road from New Berlin to the Susquehanna river. This duty was assigned to James D. Harris. The results of the survey will be found in the accompanying part of this report, to which the board refer for a more minute detail. The length of the improvement by canal is 10 miles 77 chains, lockage 59 feet, by the shortest route. The rail way improvement is $10\frac{1}{2}$ miles.

SCRIP.

Agreeably to the resolution of the Leg's'ature, passed May 20th, 1837, the board gave notice that they would receive from the holders the certificates of scrip issued by William B. Mitchell, late superintendent of the Philadelphia and Columbia rail road. They were received on the 30th day of August last, and handed over to the Auditor General for adjustment. They have not been paid in consequence of the resolution of the Legislature, having directed the payment to be made out of the improvement fund, and the whole of that fund having previously been pledged, and being necessary for other purposes.

The whole amount found due those claimants is \$20,821 81.

CLAIMS,

For retained per centage have been adjusted and paid as they have been presented by those interested. It is believed but few more cases of this description will be presented to the board.

The other description of claims referred to the board by resolutions and acts of the two last Legislatures, have been adjudicated or are in progress. They are for work done in the original construction of the improvements—and have not been paid in consequence of the want of applicable funds. The following claims have been decided, and are not paid.

Samuel R. Richards, western division.	\$351 00
John Keene, do.	818 00
George Weiser, Susquehanna,	333 00
David Morgan, Portage,	500 00
Coltart and Dilworth, Pittsburg Tunnel,	729 93 $\frac{3}{4}$

\$2731 93 $\frac{3}{4}$

Probable amount necessary to pay those to
be adjudicated,

5000 00

Whole amount necessary

\$7731,93 $\frac{3}{4}$

The following is a statement of tables that accompany this report.

- Table No. 1. Shows the navigable condition of the canal in the year ending October 31st, 1837.
- do. 2. Relates to the amount of tolls collected and paid into the treasury, year ending October 31, 1837.
- do. 3. Shows the amount of property shipped westward from Philadelphia, Portsmouth, Hollidaysburg, Johnstown, and intermediate offices; also the property taken off at Pittsburg.
- do. 4. Shows the amount of property shipped eastward from Pittsburg, Johnstown, Hollidaysburg, and intermediate offices; also the amount taken off at Portsmouth and Philadelphia.
- do. 5. Shows the amount of property shipped southward from Easton, Berwick, and Dunnstown, and intermediate offices; also the amount taken off at Bristol.
- do. 6. Shows the amount of property, shipped northward, from Bristol, and intermediate offices; also the amount taken off at Easton, Berwick, and Dunnstown.

The following table will show the amount drawn from the Treasury for the repair of canals and rail ways during the year ending October 31, 1837:

	MILES.	
Philadelphia and Columbia rail way,	82	\$61,553 22
Portage rail way,	36	40,263 25
Eastern and Juniata division,	172	78,678 85
Western,	105	67,087 56
Delaware,	59 $\frac{3}{4}$	28,530 00
Susquehanna,	39	8,000 00
North and West branches,	145 $\frac{1}{4}$	33,798 85
Beaver,	24 $\frac{3}{4}$	27,060 00
French creek,	22 $\frac{1}{4}$	19,506 84
		<hr/>
		\$364,418 57

The following table will show the amount drawn from the Treasury and applied to the payment of damages, during the year ending October 31, 1837:

Philadelphia and Columbia rail way,	\$5,600 00
Portage rail way,	885 00
Eastern and Juniata division,	4 647 41
Western,	9,013 00
Delaware,	675 00
Susquehanna,	1,600 00
North and West branches,	8,035 00
Beaver,	890 00
French creek,	2,625 00
	<hr/>
	\$33,970 41

APPROPRIATIONS.

The board recommend the following appropriations for the current year, as being absolutely necessary to the prosperity of the improvements in operation.

For renewing part of 22 miles of track Philadelphia and Columbia rail road,	\$86,500 00
“ Filling ravine at Mauls’ bridge do.	6,500 00
“ Tools for machine shop, do.	3,000 00
“ Ropes, do.	4,000 00
To pay balance on locomotive engines,	559 77
“ Complete line of rail way to avoid Columbia plane,	105,000 00
For excavating level between Clarke’s Ferry dam and the first lift lock, and building three locks,	24,402 40
“ Repairing Clarke’s Ferry dam,	21,868 00
To commence doubling locks on eastern division,	30,000 00
For mechanical impleinents, machine shop, Portage R. R.	5,000 00
To complete depot, Hollidaysburg, do.	1,235 00
For ropes, inclined planes, do.	16,000 00
“ Dams, Western division,	10,000 00
“ Locks, do.	7,000 00
“ Repair of Shamokin dam,	28,400 00
“ Repair of Nanticoke dam,	5,000 00
To commence rebuilding locks, North branch,	30,000 00
“ Repairing dams, West branch,	10,000 00
“ Complete Tangascootack extension,	34,000 00
For ordinary repair of canals and rail roads,	280,000 00
“ Damages,	30,000 00
“ New work on finished lines, pay of canal commissioners, appraisers and engineers, not connected with extensions,	30,000 00
To pay certificates of scrip issued by Wm. B. Mitchell,	20,000 00
“ Pay claims referred to the board by the Legislature,	7,731 93 $\frac{1}{4}$
	<hr/>
	\$716,197 10 $\frac{1}{4}$

The fund for repairs is exhausted, the appropriation for this purpose ought in the opinion of the board to be made as early as possible, as many heavy repairs must be made during the interval, before the next opening of navigation.

The board recommend the following appropriations for the current year as being absolutely necessary to the prosperity of the work under contract and extensions:

For Erie extension, to be applied to work under contract and new work,	500,000 00
“ North branch extension, do.	500,000 00
“ Gettysburg extension, do.	350,000 00
	<hr/>
	\$1,350,000 00

Before closing this report it is proper to observe that evident improvement has been made in the manner of conducting every department of the public works, and that no doubt remains that the whole system of improvements, however extended, can be managed with efficiency and entire success.

The board cannot dismiss the subject without expressing their high sense of gratification in being able to communicate to the friends of humanity, that the works of the Commonwealth are prosecuted without the use of ardent spirits; that a provision has been inserted in the contracts prohibiting its use, which has been found to have a very beneficial effect.

By order of the board,

MOSES SULLIVAN, *President.*

Attest,

E. F. PENNYPACKER, *Secretary.*



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The following Table exhibits the navigable condition of the Canal during the year ending October 31, 1837.

WESTERN DIVISION.

When Navigation became obstructed.	Cause of Obstruction.	When resumed.	Duration of Obstruction.
December 3.	Ice,	March 20.	106 days.
April 5.	Breach,	April 6.	1
May 17.	do.	May 17.	2
June 16.	do.	June 20.	4
July 1.	High water, slips and breaches.	July 7.	6
September 18.	Breach.	September 22.	4

JUNIATA DIVISION.

When Navigation became obstructed.	Cause of Obstruction.	When resumed.	Duration of Obstruction.
December 1.	Ice,	March 22.	110 days.
April 5.	Lock gate broke,	April 8.	3
April 10.	Breach,	April 12.	2
October 9.	do.	October 16.	7

EASTERN DIVISION.

When Navigation became obstructed.	Cause of Obstruction.	When resumed.	Duration of Obstruction.
December 1.	Ice,	March 23.	111 days.
March 27.	Breach,	March 27.	2
April 14.	do.	April 15.	1
June 18.	do.	June 18.	2
July 25.	Sheeting of lock No. 7 gave way.	July 26.	1
July 29.	Breach,	July 31.	2
October 8.	do.	October 9.	1

DELAWARE DIVISION.

When Navigation became obstructed.	Cause of Obstruction.	When resumed.	Duration of Obstruction.
December 3.	Ice,	March 20.	106 days.
May 1.	Breach,	May 10.	9
June 4.	Failure of aqueduct, Hough's creek	June 7.	3

SUSQUEHANNA DIVISION.

When Navigation became obstructed.	Cause of Obstruction.	When resumed.	Duration of Obstruction.
November 27.	Ice,	March 31.	124 days.
July 6.	Breach,	July 12.	6
July 20.	Culvert failed,	July 22.	2
September 13.	Breach.	September 15.	2

WEST BRANCH DIVISION.

When Navigation became obstructed.	Cause of Obstruction.	When resumed.	Duration of Obstruction.
November 27	Ice	March 30	123 days.
April 10	Leak in culvert	April 18	2
May 6	Breach	May 6	3
May 25	do.	May 27	2
June 27	do.	June 29	2
July 6	Failure of culvert near Williams-	July 18	13
July 28	do. do.	August 12	14
August 5	Breach	August 23	18
September 2	Breach at cross cut	September 5	3
" "	Failure of culvert at J. Smith's	September 10	2
September 11	Breach	September 15	4
October 1	do.	October 7	6

NORTH BRANCH DIVISION.

When Navigation became obstructed.	Cause of Obstruction.	When resumed.	Duration of Obstruction.
November 17	Ice	April 6	138 days.

BEAVER DIVISION.

When Navigation became obstructed.	Cause of Obstruction.	When resumed.	Duration of Obstruction.
November 27	Ice	April 4	126 days.
April 4	Breach	April 18	14
December 13	Ice	March 12	88
April 14	Breach	April 16	1
July	Much injured by freshet		

FRENCH CREEK.

Statement showing the amount of Tolls collected at each Collectors' office upon the Pennsylvania Canal and Rail way, and paid into the Treasury during the year, ending October 31st, 1837.

CANAL.

COLLECTORS.	OFFICES.	AMT. OF TOLLS.
William C. M'Pherson,	Columbia,	\$58,772 61
John Walburn,	Portsmouth,	36,561 48
Joseph Smith, late collector,	do.	7,306 33
David Alter,	Harrisburg,	24,219 42
Jacob Alter, late collector,	do.	6,500 00
David Cunningham,	do.	1,000 00
A. W. Hamilton,	Newport,	4,764 45
Hamilton Sample,	Lewistown,	6,663 47
A. W. Benedict,	Huntingdon,	8,900 81
Wm. Williams, late collector,	do.	463 88
Joseph Hammer,	Hollidaysburg,	63,584 62
Frederick Sharretts,	Johnstown,	77,437 46
James Moorhead,	Blairsville,	1,937 25
John L. Leech,	Leechburg,	750 00
Thomas Farman,	Alleghenytown,	43,124 62
Alfred Sutton, late collector,	do.	6,962 74
Stephen P. Stinson,	Easton,	64,868 47
Isaac M'Carty,	New Hope,	4,551 43
Charles B. Knowles, late collector,	do.	4 27
Giles Knight,	Bristol,	18,872 83
Wm. T. Rogers, late collector,	do.	1,857 77
Frederick Speck,	Liverpool,	1,711 25
Robert Moody,	Northumberland,	19,085 28
Wm. S. Evans,	Berwick,	8,850 35
Wm. E. Camp,	Dunsbury,	2,189 19
John Fleming, late collector,	do.	18 88
John S. Darrsh,	Bridgewater,	1,667 18
John English, former collector,	do.	116 41
James S. Myers,	Franklin,	1,078 81
Job G. Patterson,	Pittsburg Aqueduct,	1,977 00
Rudolph Fissler,	Swatara Aqueduct,	829 63
James M'Cormick,	Kiskeminettas do.	334 42
John M'Farren,	Duncan's Island, do.	109 55
William Parsons, late collector,	do. Bridge,	1,284 68
William Holmes,	Outlet locks, Columbia,	278 96
Christian Winter,	do. Portsmouth,	138 62
		<hr/> \$473,261 11

RAIL ROAD AND MOTIVE POWER.

COLLECTORS.	OFFICES.	RAILWAY.	MOTIVE POWER
Thomas Moore,	Philadelphia,	112,906 18	61,202 01
Wm. C. M'Pherson,	Columbia,	72,014 91	60,348 91
Thomas L. Smith, late collector,	do.	4,903 35	
Joseph Hammer,	Hollidaysburg,	43,271 91	44,160 76
Frederick Sharretts,	Johnstown,	26,004 79	35,085 94
H. F. Benedict,	Lancaster,	12,297 57	8,210 26
Evan Evans,	Downingtown,	9,304 50	6,645 40
John Williams,	Paoli,	3,914 05	932 00
John Parr,	Schuylkill Viaduct,	192 80	
C. Hartnack, late collector,	do. do.	694 15	
Whole amount railways,		285,504 01	216,585 37
do. do. motive power,		216,585 37	
do. do. Canal,		473,261 11	
Aggregate amount,		975,350 49	

TABLE No. 3.

[Page 26.]

The following Table contains a statement of the different kinds of property shipped Westward from Philadelphia, Portsmouth, Hollidaysburg, Johnstown, and intermediate Offices; also, the amount taken off at Pittsburg from the East.

ARTICLES.	PHILADELPHIA.	PORTSMOUTH.	HOLLIDAYSBURG.	JOHNSTOWN.	INTERMEDIATE OFFICES.	TAKEN OFF AT PITTSBURG.
Floor,	barrels	4,795½	189	12	262	
Wheat,	bushels	58,206	1,044		58,206	
Coro and other grain,	do.	10,939	2,937	680	12,020	20
Clover and other grass seeds,	do.	148	15	117	574	5,494
Potatoes,	do.	23,975	100		720	
Salted beef,	barrels	114				5,333
do pork,	do	3	50			
Bacon,	do.	15,160	19,743		10,000	11,120
Fish,	barrels	1,290½	14,834	10,849	10,087	11,191
Butter and cheese,	do.	19,150			23,045	33,744
Lard and tallow,	do.					359
Salt,	bushels	45,212	108,724	1,126	5,324½	156,623
Provisions, not specified,	do.	9,761	29,457		486,525	
Feathers,	do.	9,718		13,317		
Wool,	do.	364,685	47,590	268,633	327,456	342,200
Cotton,	do.	307,465		10,719	55,000	55,000
Hemp,	do.	581,982	67,524	617,466	581,601	570,902
Tobacco,	do.	191,769	96,656	62,026	2,199	176,480
Leather,	do.	275,477	61,750	275,111	10,398	222,407
Raw hides,	do.	830,806	730,424	235,552	15,034	236,741
Furs and peltry,	do.				73,078	
Whiskey and domestic spirits,	do.	6,253	14,261	160,280	74,518	76,419
Morchaudize,	do.	18,847,825	17,041,873	16,641,873	29,656	26,394,639
Groceries,	do.	16,276,220	5,220,446	7,240,347	1,911,318	0,512,188
Oil,	do.	48,748	14,836	57,600	7,267	77,226
Drugs and dye-stuffs,	do.	241,647	261,610	303,147	33,373	264,850
Gypsum,	do.	3,120½	7,571	824	1,093	29½
Furniture,	do.	1,501,410	263,160	1,264,660	173,533	2,140,757
Window glass,	do.	1,399	9,532		43½	55
Rags,	do.	410,551			651,098	
Mineral coal,	do.	1,124	602	10,102	31	2,080
Iron ore,	do.				633	
do. pigs and castings,	do.	761,019	1,316,808	503,024	5,346	1,132,738
do. blooms, bar and sheet,	do.	2,778,232	3,327,078	32,460,452	2,475,276	25,425,868
Lead, in pigs and bars,	do.	73,827	587	26,784	3,394,774	
Copper and tin,	do.	197,707	78,147	412,302		390,848
Marble,	do.	807,870	150,679	649,717	915,555	874,922
Lime,	do.			672		
Limestone,	do.				1,612	
Ter,	do.				281	
Bricks,	do.	214½				
Timber,	do.	33,413	43,780	795	140,679	38,000
Sawed lumber,	do.	33,043	21,451	38,019		7,500
Staves, heading and hoop poles,	do.	208,411	1,451,095	210,465		47,290
Shingles,	do.	11,327	123,206		128,070	132,360
Posts and rails,	do.		9,000	12,200		6,000
Sundries,	do.	566,450		163	40,700	
Number of boats and cars cleared,	do.	23,365,627	5,465,707	1,978,453	1,683,781	890,491
Passengers, miles travelled,	do.	22,332	2,517	16,131	1,770	7,498
			16,316	802,715		454,045

TABLE No. 4.

[Page 26.]

The following Table contains a statement of the different kinds of property shipped Eastward from Pittsburg, Johnstown, Hollidaysburg and intermediate offices, also the amount taken off at Portsmouth and Philadelphia.

ARTICLES.	PITTSBURG.	JOHNSTOWN.	HOLLIDAYSBURG.	INTERMEDIATE OFFICES.	TAKEN OFF AT PORTS MOUTH.	TAKEN OFF AT PHILADELPHIA.	
Flour,	barrels.	71,586	58,249	60,560	74,231	26,076	91,216
Wheat,	bushels.	128,008	42,014	328,363	125,497	140,240	13,897
Coro and other grain,	do.	8,150	12,168	60,489	302,798	187,427	200,315
Clavet and other grass seeds,	do.	195	4,764	3,115	5,585	21,027	2,957
Potatoes,	do.	1,568	3		5,282	530	0,090
Salted beef,	barrels.	267	2	9	2	12	56
do. pork,	do.	2,072		2,934	20,018	1,308	635
Bacon,	pounds.	5,640,936	8,071,311	5,417,042	234,742	75,648	3,860,074
Fish,	barrels.	65	17	43	153	12	3
Butter and cheese,	pounds.	86,940	86,883	249,803	4,087,783	452,447	283,956
Lard and tallow,	do.	749,725	615,597	583,186	28,014	143,133	358,148
Salt,	bushels.		15,427	11,975	37,605	1,680	
Provisions not specified,	pounds.	2,335	97,149		4,004,591	108,898	297,362
Feathers,	do.	44,827	17,169	41,317		520	13,060
Wool,	do.	325,603	302,617	326,464	13,290	14,109	222,332
Cowee,	do.	584,720	803,309	983,401	2,242	194,900	515,175
Hemp,	do.	34,059			10,200		
Tobacco,	do.	2,410,232	2,282,831	2,564,067	44,865	321,151	2,000,094
Leather,	do.	11,656	5,755	17,608	803,950	584,053	381,285
Raw hides,	do.	39,955	116,200	12,667	3,010	13,847	
Furs and peltry,	do.	81,588	14,395	175,402	472	13,686	4,310
Whiskey and domestic spirits,	gallons.	70,684	32,622	60,910	542,129	219,997	381,125
Merchandize,	pounds.	844,977	168,926	304,957	237,363	38,689	323,433
Groceries,	do.	403,972	114,768	86,374	107,073		8,854
Oil,	gallons.	1,251	1,441	2,031	60	30	1,501
Drugs and Dye-stuffs,	pounds.	13,608	3,509	30,034	18,949		25,228
Gypsum,	tons.			72	0,044		
Furniture,	pounds.	170,700	49,964	97,707	282,611	84,720	188,991
Window glass,	he ves.	8,650	6,789	13,146	5	17,402	5,138
Rags,	pounds.	45,901	48,075	50,307	131,855	13,455	74,480
Mineral coal,	tons.	875	154	11,012	18,465	7,392	641
Iron ore,	do.				222	36	
Pigs and castings,	pounds.	366,715	138,745	399,191	6,027,092	3,064,978	1,133,275
Blocks, bar and sheet,	do.	816,441	162,416		5,068,064	74,001	3,042,364
Lead in pigs and bars,	do.	7,394	7,888	1,323	6,094		29,613
Copper and tin,	do.	1,190		118	6,210		1,834,935
Marble,	do.	2,310			2,176,513		
Lime,	bushels.				16,094		
Limestone,	perches.				849		
Slate for roofing,	pounds.						
Bricks,	number.	41,350	16,850	43,300	134,711	95,700	
Timber,	feet.		36,029	49,570	75,931	31,030	
Sawed lumber,	do.	110,294		244,252	5,758,605	705,410	1,474,747
Naves, heading and hoop poll,	pounds.	38,360			1,021,604	622,348	316,209
Shingles,	number.	23,500	13,320	61,881	1,324,000	81,000	368,792
Nails and rails,	do.		17,879	1,195	5,863	2,278	70,720
Sundries,	pounds.	1,030,260	349,849	543,824	3,364,404	4,034,698	9,973,731
Number of boats and cars cleared,		2,331	12,209	2,530	32,730	1,283	
Passengers, miles travelled,		2,191,937	273,958	36,116	6,140,614	6,918	2,415,481
Amount of tolls received,							

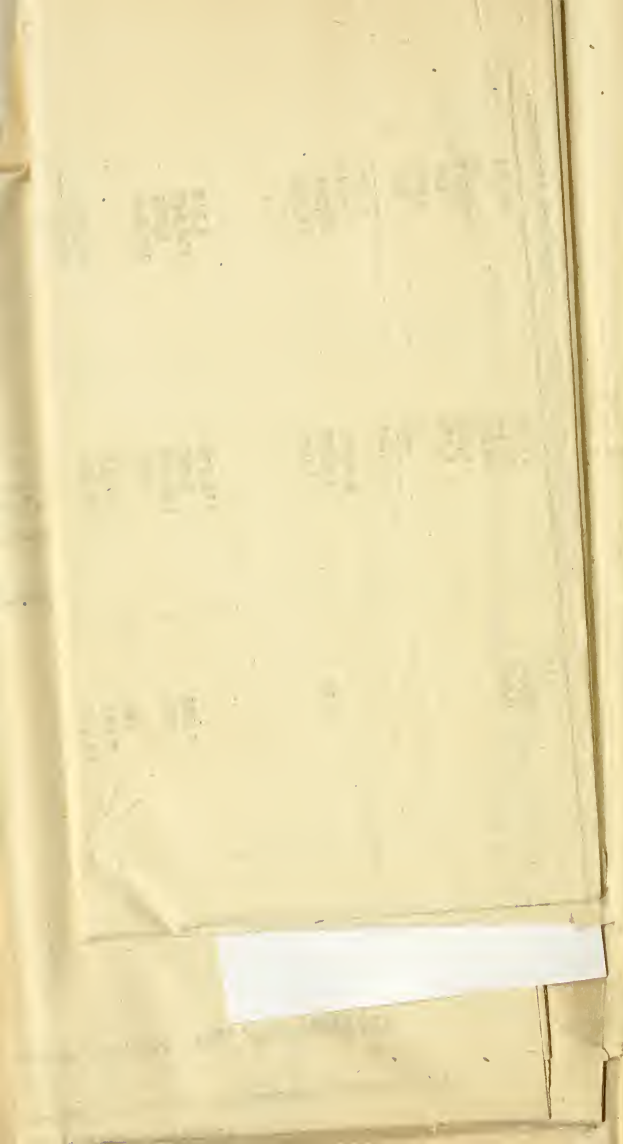
2 feet wide on top and 8 feet long. The stones are squared, and laid in full mortar, and arranged in such manner as to form a system of headers and stretchers, and the filling up are of stones of the best quality, well connected with bond stones. The down stream corners of the piers and abutments to high water mark, are all clamped with strong iron clamps to prevent them from being disturbed by ice or by boats. The platform or floor of the bridge will be supported by four segments, trussed and arched, placed at such distances apart as to admit of two passages each, nine feet eight inches in the clear, and one four feet in the clear. The fourth segment

The following Table contains a statement of the different kinds of property shipped Southward from Easton, Berwick, and Dunnstow, and intermediate Offices; also, the amount taken off at Bristol.

ARTICLES.		EASTON.	BERWICK.	DUNNBERG.	INTERMEDIATE OFFICES.	TAKEN OFF AT BRISTOL.
Flour,	barrels	40,800	54	561	17,618	38,221
Wheat,	bushels	5		13,946	69,441	11
Corn and other grain,	do.	35,075	859	6,459	50,046	30,517
Clover and other grass seeds,	do.	871			6,248	137
Potatoes,	do.	2,041	23		4,179	6,340
Salted beef,	barrels				2	112
do. pork,	do.		1		299	
Hacon,	pounds				13,734	4,000
Fish,	barrels	2				4
Butter and cheese;	pounds	50,465	10,161		307,074	53,304
Lard and tallow,	do.	5,243			18,677	18,930
Salt,	bushels		282	22	1,067	
Provisions, not specified,	pounds					
Feathers,	do.					
Wool,	do.					4,318
Cotton,	do.	4,318				
Hemp,	do.				119,770	105,347
Tobacco,	do.	5,262			1,600	6,388
Leather,	do.	200,853	7,603	5,022	139,614	247,836
Raw hides,	do.			500	347	
Furs and peltry,	do.					
Whiskey and domestic spirits,	gallons	234,623	472	130	112,035	189,028
Merchandize,	pounds	8,425	2,523	7,571	19,460	49,656
Groceries,	do.	1,420	150	23,457		5,875
Oil,	gallons	22,848			0,587	25,518
Drugs and dyestuffs,	pounds					2,000
Gypsum,	tons		1			
Furniture,	pounds	73,434	32,898	7,700	127,359	71,288
Window glass,	boxes				22	32
Rags,	pounds	80,194		1,440	90,740	127,772
Mineral coal,	tons	157,588	17,492	84	10,683	141,987
Iron ore,	do.	1,467			123	635
do. pigs and castings,	pounds	1,423,323	39,744	1,484,320	1,730,944	1,143,972
do. blooms, bar and sheet,	do.	82,228	9,029	736,313	304,782	182,823
Lead, in pigs and bars,	do.					
Copper and tin,	do.	852			1,050	
Marble,	do.	700				
Lime,	bushels	9,300		290	105,029	38,541
Limestone,	perches	86		9	2,428	1,481
Slate for roofing,	pounds	867,641				548,920
Bricks,	number		1,556	11,600	9,813	
Timber,	feet		6,830	4,019	406,093	
Sawed lumber,	do.	920,502	382,294	17,932	1,317,151	1,182,323
Staves, heading and hoop poles,	pounds	23,520	102,350		1,557,152	22,400
Shingles,	number	76,000		8,000	455,052	76,000
Posts and rails,	do.		335	2,855	3,559	900
Sundries,	pounds	3,869,215	11,178,922	1,188,845	23,827,959	16,861,588
Number of boats and cars cleared,		3,078	808	298	2,634	3,665
Passengers, miles travelled,		3,746	2,819	3,947	671,346	557,791

The following Table contains a statement of the different kinds of property shipped Northward from Bristol, and intermediate offices, also the amount taken off at Easton, Berwick and Dunnstow.

ARTICLES.	BRISTOL, NORTHWARD.	INTERMEDIATE OFFICES, NORTHWARD.	TAKEN OFF AT EASTON.	TAKEN OFF AT BERWICK.	TAKEN OFF AT DUNNSTOWN.
Flour,	barrels.	472	767	144	1,282½
Wheat,	bushels.	74,350	3,320	62,832	338
Corn and other grain,	do.	69,940	16,507	62,434	40
Clover and other grass seeds,	do.	1,099	19	2,514	1,933
Potatoes,	do.	156		257	8
Salted beef,	barrels.	312½		213	850
do. pork,	do.	369		555	
Bacon,	pounds.	228,948	19,618	190,668	6
Fish,	barrels.	4,063	2,396½	4,872	735½
Butter and cheese,	pounds.	14,210	300	14,134	553
Lard and tallow,	do.	2,222		6,182	
Salt,	bushels.	45,541	9,474	39,310	2,734
Provisions not specified,	pounds.			5,380	
Feathers,	do.	1,244		654	
Wool,	do.	9,200	500	10,000	183
Cotton,	do.	78,387		89,538	
Hemp,	do.	21,957		25,270	
Tobacco,	do.	355,787	898	352,539	
Leather,	do.	10,088	4,513	7,988	1,068
Raw hides,	do.	423,877	46,948	480,480	750
Furs and peltry,	do.	836			14,827
Whiskey and domestic spirits,	gallons.	22,069	5,378	19,618	4,717
Merchandise,	pounds.	243,134	2,274,447	925,710	5,510
Groceries,	do.	2,484,682	869,630	2,358,869	486,276
Oil,	gallons.	20,003	501	17,292	138,522
Drugs and Dye-stuffs,	pounds.	390,311		344,947	64
Gypsum,	tons.	3,700	810	3,209	
Furniture,	pounds.	73,481	157,674	179,380	184
Window glass,	boxes.	693		405	21,300
Rags,	pounds				
Mineral coat,	tons.	48	2,393½	50	
Iron ore,	do.	109,198	4,507		22½
“ pigs and castings,	pounds.	1,231,110	411,942	181,085	750
“ blooms, bar and sheet,	do.		205,200	1,100,257	241,095
Lead in pigs and bars,	do.			5,164	185,940
Copper and tin,	do.		1,265	35,853	29,808
Marble,	do.	117,976	16,545	127,125	
Lime,	bushels.	1,370		1,547	3,901
Limestone,	perches.		25		5,769
Slate for roofing,	pounds.				170½
Bricks,	number.	33,790	8,213	19,220	675
Timber,	feet.	16,625			287
Sawed lumber,	do.	33,611	13,746	13,312	8,689
Staves, heading and hoop poles,	pounds.	32,887	500	110,887	1,418
Shingles,	number.	288,500	26,000		7,400
Posts and rails,	do.	1,500			20,850
Sundries,	pounds.	5,182,991	461,388	1,587,327	2,500
Number of boats and cars cleared,		3,185	1,901	3,002	700
Passengers, miles travelled,		21,713	703,836	3,002	360,011
Amount of tolls received,				11,872	742
					1,049



No. 1—H. R. 10.

Report of John P. Bailey, Engineer upon Main Line.

*Parkersville, Nov. 8th, 1837.**To the Board of Canal Commissioners:*

GENTLEMEN—The following annual statement is respectfully submitted:

The new bridge at Duncan's Island is progressing rapidly, and in a fair way to be ready for the spring business: The mason work will all be finished, and one span of the superstructure raised by the 15th inst. The materials are all of the best quality, and the workmanship unsurpassed on the river. There is not the slightest indication of irregular settling in any of the masonry: It will stand the test of time and endure for ages, unless an extraordinary freshet above any thing yet known, should sweep off the superstructure. It is built for strength, neither will it fail in beauty, and altogether, will be mostly approved. It is built on the site of the old bridge.— Nothing would have been gained in preventing the deposit of sand in the mouth of the canal, by placing the bridge higher up stream. There is a continued bed of sand along the shore of Duncan's Island, from the bridge nearly to the head, which has been deposited there by the river. If a basin like the mouth of the canal, were cut into it any where above the bridge it would fill up in a short time. One span of 200 feet in length, and 600 feet of new canal, and two new locks are saved by placing it on the old site. The cost of the new bridge, with these additional expenses, was estimated last winter at \$111,813 00. By placing it on the old site the cost will be less than \$80,000 00. The bridge will stand on nine piers and two abutments. The eastern abutment of the old bridge was taken down entirely and rebuilt, and the western partly taken down and rebuilt.— The span on the eastern abutment will be 160 feet in the clear, and the remaining nine spans each 200 feet in the clear. The piers are 12 feet thick on top, and 34 feet long. The stones are hammer dressed, squared, and laid in full mortar, and arranged in such manner as to form a system of headers and stretchers, and the filling up are of stones of the best quality, well connected with bond stones. The down stream corners of the piers and abutments to high water mark, are all clamped with strong iron clamps to prevent them from being disturbed by ice or by boats. The platform or floor of the bridge will be supported by four segments, trussed and arched, placed at such distances apart as to admit of two passages each, nine feet eight inches in the clear, and one four feet in the clear. The fourth segment

is put in to support a double towing path, a single tow path being insufficient to accommodate the business of the canal. The third passage will answer for a foot way. The height of the bridge from the bottom of the chord to the top of the plate will be $17\frac{1}{2}$ feet. The contractors have had as many as 212 hands at a time employed on this work. Should the weather be at all favorable, it will be ready for towing over by the time the canal opens in the spring. The means provided for ferrying boats over during the past summer, have fully answered the purpose, first, by means of a rope ferry, and subsequently, by substituting a steam boat, when it became necessary to remove the superstructure of the old bridge. The trade has passed without interruption as fast as it came, "and there has been no delay, on account of the destruction of a portion of the old bridge." But there has been serious delay on account of low water in the dam. This difficulty has existed every season, in time of low water, since the canal was first opened. No remedy has ever been attempted except by gravelling the dam, or trying to stop it with straw and leaves. The dam breast is half a mile long, formed of crib work, filled and backed with stone. It is folly, a waste of time and labour, to attempt to close it tight enough to be of any service during the short period of a few days that low water usually exists. Some pretend to say, that when the leaves begin to fall, they collect about the breast of the dam and stop the water.— This is all a mistake, arising from ignorance of the true state of the case. The breast of the dam has been as clear of leaves since they began to fall this season, as it was before. No leaves are to be seen, or have been seen, either on it or in it, or any where about it. The water rose in the river from rains above, and not the slightest on account of any stoppage in the dam.

The only remedy that will effectually put a stop to the difficulty, will be to sink the two mile level, next below the dam, 18 inches, and double the two guard locks and lift lock, and sink their mitre sills 18 inches lower than the mitre sills of the present locks. This additional depth during the time of low water, the past season, would have prevented interruption to the navigation. But to complete a perfect remedy it will be necessary, in addition to the above, to sink a crib the whole length of the present dam, immediately back of the present stone filling in the deep water, where there is level bottom. The crib to be bottomed, sunk, and filled with small stone, and raised on the lower side to within 18 inches as high as the comb of the present dam and sloped backwards; to be sheet piled tight on the upper side with a double line of sheeting fastened with spikes to the crib: the crib to be filled with stone, and sheeted tight on top, with six inch plank, and rip-rapped above and below, level with the top of the crib. The comb of the new dam would be one foot lower than the comb of the old dam. This work would be out of reach in high water, and in low water would form a tight dam. It would be 80 feet higher up stream than the present crib. The stone backing of the present dam extending back about 80 feet. Were the new dam put in, the old one, or any portion of it, at any time that it might require repairs,

could be taken out and rebuilt in the summer season, without the water being lowered in the dam.

I respectfully and with great earnestness recommend these improvements to the board. The Wisconsin cannot be brought in, to be of any service as a feeder. If emptied into the two mile level, it would be of no more service than it is at present, emptying in 15 miles above, and if taken in below the first lift lock, the two mile level would still be in the same condition it is at present, and the navigation stopped in time of low water, and if the two mile level be put in navigable condition at all stages of the river, it will let in abundance of water to feed the canal below, and the Wisconsin would be unnecessary as an additional feeder. It could be of no service unless for canalling purposes.

Estimate of the cost of doubling the three locks on the two mile level and sinking the level eighteen inches :

23,820 cubic yards excavation, at 20 cents,		\$1,764 00
3,300 perches masonry,	\$4 00	13,200 00
60,000 feet B. M. timber,	12 00 per M.	720 00
3,500 feet cut stone,	60	2,100 00
Lock gates,		1,100 00
		<hr/>
		22 184 00
Add 10 per cent.		2,218 40
		<hr/>
Total,		<u>\$24 402 40</u>

Estimate of the cost of cribbing the dam on the plan described above :

72,000 solid feet of timber	at	10 cts.	\$7,200 00
28,000 do. 6 inch plank		12	3,360 00
6,000 do. 3 inch do.		12	720 00
23 tons of iron spikes,	\$200 00 per ton,		4 600 00
20,000 perches of rip-rapping		20	4,000 00
			<hr/>
			19,880 00
Add 10 per cent.			1,988 00
			<hr/>
Total,			21,868 00
Add the above cost of			21,422 40
			<hr/>
Total cost of the whole work,			<u>\$46,270 40</u>

It will probably be found by referring to the reports of the supervisors, that the annual expense of gravelling the dam heretofore, and lighting boats over during low water, exceeds the annual interest of the above estimate; and the loss of tolls to the Commonwealth on account of the detention, and the heavy draw-back on the transporter, are considerations which further entitle it to the particular attention of the board.

LIGONIER DIVISION.

The cut round the abutment of the Blairsville bridge will be completed the latter part of this month, with the masonry and bridging. This will be a valuable improvement. The present mode of passing boats under the bridge is inconvenient at all times, and in high water there is great danger of being carried over the dam. The canal round the abutment removes the inconvenience and the danger at a small expense.

Estimate of the cost at the contract prices :

9,800	cubic yards excavation,	at	10 cts.	\$980 00
7,200	" hard-pan,		12½	900 00
680	" detached rock,		25	170 00
1,000	" embankment, estimate,		10	100 00
640	perches masonry,		2 00	1,280 00
116	feet bridge superstructure		17 50	1,020 00
	Temporary bridge for turnpike, estimate,			100 00
				<hr/>
				4,560 00
Add 10 per cent.				456 00
				<hr/>
Total,				<u>\$5,016 00</u>

Two of the dams on the Connemaugh, the 2d and 4th of the division, were put under contract for repairs the 25th of May last. The contract for the 4th, has been completed in a substantial and durable manner, according to the plan and specifications, and the final estimate made thereon; cost \$3,892 00. The contractor for the second failed in executing the work according to contract and the plan and specifications. The work which he had done, was swept out, turned bottom up, and lodged on the bar below, and the character of the work done exposed to view by a freshet which occurred the 2d or 3d of September. It was to have been completed, according to contract, the 1st day of September. There was to be a crib sunk immediately below the apron of the present dam, formed of four longitudinal divisions, four feet apart each, from centre to centre, tied with cross ties in divisions, in like manner of four feet apart from centre to centre.—The crib was to have a bottom in it, spiked on the first course of longitudinal logs, extending from the front of the crib back on the third log. It was to be bottomed in this manner from one extremity of the dam to the other. When the crib came up to view it was found to be bottomed back only on the second log, and about 80 feet at one end had no bottom in it at all; when the freshet occurred, the crib was about one-third filled with stone. The manner of its turning bottom up is easily accounted for, by the weight of stone in the part which was bottomed, keeping that side down, the other rolled over it, emptied the stone out, and the thing floated off by the greater weight of the water. The crib for dam No. 4, which was sunk below the apron of the old dam, was constructed according to the plan and specifications as described in some measure above, and was filled with stone when the freshet occurred, without the top sheeting, which was

to cover it and to assist in securing it to its position by being spiked to the sheeting of the old dam. This crib remained firm in its place without being disturbed by the freshet. It was too late in the season to do any thing further towards completing the repairs of dam No. 2, and the contractor has given up his contract. Such materials delivered upon the ground, and work done towards preparing them for the work, will be estimated. But inasmuch as the whole work was not done within the time specified in the contract, and the work done and swept away not done according to the plan and specification, the contractor was not entitled to an estimate upon it. I would here, most respectfully, remind the board of the great necessity of having superintendents skilled in the business, employed to give constant personal superintendence to mechanical work under contract, of wood or stone. Without this it seems impossible to have work properly executed; and the loss to the Commonwealth, eventually, is much greater than the cost of superintendence. The work may have the external appearance of strength, but sooner or later, show that the materials and workmanship within, are defective.

PORTAGE RAIL ROAD.

The depot and machine shop at Hollidaysburg, which the board directed to be put under contract, is rapidly progressing toward completion. It will be finished this fall. The cost will be something more than the money appropriated. The whole work except the turning platforms and rail way was let for \$3,945 00. The whole cost including these will be about \$4,300.

The Portage rail road, with its ten inclined planes, is capable of doing all that will be required of it, with safety and expedition. The excitement which has been up against the inclined planes of the Commonwealth, arose from the bad management they had received. The delays and accidents that attended them, resulted from inexcusable or wilful negligence, and were not chargeable to failure in the planes to accomplish what had been expected from them. The planes in their present condition, which is defective, are capable of passing four loaded cars each way, every ten minutes; or 576 loaded cars both ways, every twelve hours. They could be run night and day, and pass in twenty-four hours, both ways, in their present condition, 1152 loaded cars.

The cost of maintaining the planes, the past year, from the statement of the superintendent of transportation, amounts to \$45,997 50, viz:

180,000 bushels of coal, a 4t c.	\$7,200 00
Oil and tallow,	600 00
Engineers,	6,287 50
Assistants and firemen,	5,100 00
Hitchers,	6,300 00
Smiths,	785 00
Riggers,	1,845 00
Ropes,	16,000 00
Iron castings and steel,	1,200 00
Miscellaneous,	650 00

Total,

\$45,967 50

The cost of running one locomotive engine on the Portage, including repairs, averages less than \$8 per day. Locomotives can work with advantage on all the levels except the short one at the foot of No. 6. It will save expense and systematise and facilitate the transit of business to substitute them in place of horses. It is the intention of the superintendent, to place them upon the road, as fast as arrangements can be made for them. It will require 14 locomotives on the road, to pass the greatest amount of business the planes are capable of passing daily, or 573 loaded cars both ways, in twelve hours. Daily expense of running fourteen locomotives at \$8 per diem, \$112 00. The cost of running them 240 days or eight months, the usual time of keeping the road in operation in each year, \$26,880 00; add the annual expense of maintaining the planes; and the maximum annual cost of maintaining the motive power on the road, will amount to \$72,847 00. The summit of the Portage is 1171.58 feet above Johnstown and 1388.71 feet above Hollidaysburg. The shortest road that can be made to avoid the planes by grades, not exceeding 50 feet per mile, on the east side of the mountain, and not exceeding 44 feet per mile, on the west side of the mountain, would be 26.59 miles of continuous grade, of 44 feet per mile on the west side, and 27.97 miles with a continuous grade of 50 feet per mile, on the east side of the mountain. Whole length, 54.56 miles. Locomotives could not at the outside make more than one trip and a half per day, upon an average, on these heavy grades; and the heaviest engines would be required. The power of the heavy engines has been fully demonstrated by their daily performance on the Hollidaysburg grade of 52 feet per mile. The average load on this grade is 14 loaded cars. It would require 30 locomotives in constant use on a rail way to avoid the planes, to pass the same amount of business that the present road is capable of passing in the same time. Daily cost of running 30 engines at \$8 per day, \$240 00. Cost of running them 240 days or eight months, \$57,600 00. It is plain from the above calculations, that grades of 50 feet to the mile are preferable decidedly to inclined planes. But the question is the expediency of avoiding the planes now they are in operation. They are capable of doing the business required of them at much less expense than it ever can be done by making a road to avoid them. It requires about one-third of the whole number of engines on the road to be in the shops undergoing repairs, or ready for use in case of accident to those at work. The whole number therefore which would be required on the present road, would be 21 engines: and the whole number on the rail way to avoid the planes, forty-five engines.

45 Engines,	at	\$7000 00 each,	\$315,000 00
21 do.	at	7000 00 "	147,000 00
Difference,			\$168,000 00
Add the cost of rail way to avoid planes,			\$1,600,000 00
Total,			<u>\$1,768,000 00</u>

Annual interest at 5 per cent. on the above sum,	\$88,400 00
Add annual expense of running 30 locomotives,	57,600 00
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Total annual expense of a new road,	\$146,000 00
Deduct annual expense of present road,	72,847 00
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Annual expense of a new road over and above the } annual expense of the present road,	\$73,153 00
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Passenger cars (with the planes properly improved and with the use of locomotives,) can pass the Portage in four hours and a half, being at the rate of eight and a half miles an hour; and burden cars under proper regulations may pass in seven to nine hours: The delay is not so much on the Portage as on the canal. Packet boats cannot exceed four miles an hour, and freight boats cannot much exceed two and a half miles an hour. \$73,153 00 is the annual interest of \$1,063,060 00. There would be much gained by expending this money in extending the ends of the Portage down the Juniata and Conemaugh, say in all forty miles. This distance would then be travelled by engines in two hours, which now requires ten hours in packets. But a rail way to avoid the Portage could not be traversed by engines in much less than three hours; and the present Portage may be passed in four and a half hours—only one and a half hours difference. By extending the present road at the ends, as mentioned above, with the money required to avoid the planes, the time saved would be seven hours and a half; and the road carried down the canal to points where there is abundance of water to supply it at all times; thereby saving the necessity of appropriations for feeder dams; and preventing interruption to the navigation. In every point of view therefore it would be unwise in the extreme now to abandon the Portage planes.

The roofing of the planes, by commencing one or two of them next summer, is respectfully recommended to the board. The cost of one of them, estimated at \$3,500 00. The protection it would give the rope, and road way, and the machinery altogether, would more than pay the cost.

Rail way, to avoid the Inclined Plane at Columbia.

The board are fully acquainted with the situation of this work, having passed over it, but a short time since. It will need, and will deserve their attention. No objection can be made against it. The interest on the cost of construction, will be little over half the present annual expense of maintaining the plane, and its length will be 600 feet shorter than the old road. It will, therefore, be an actual saving to the Commonwealth. The contractors have been carrying on the work, at a disadvantage without an appropriation, borrowing money on the estimates, and getting about 70 cents on the dollar.—Should means be provided early, the grading may be completed this winter, and the rails transferred from the old road, during the early part of next summer.

Estimate of the cost of grading the Rail way. to avoid the Columbia Plane, at the contract prices.

Section, No. 1.

WORK DONE TO FIRST OF OCTOBER.

22202	cubic yards, common excavation,	\$1,970 43
1379	" " detached rock,	372 33
3816	" " slate rock,	1,030 32
1524	" " solid rock,	731 52
27611	" " embankment,	2,450 47
33	feet cross drains,	57 75
	grubbing and clearing,	47 50
	temporary bridge, over public roads, estimate,	175 00
50	perches slope wall, "	50 00
1156	perches masonry,	2,161 72
	excavating and timbering bridge foundation, estimate,	184 64
	work done, to superstructure of bridge, "	138 00
		<hr/> <hr/>
		\$9,369 68

WORK TO BE DONE.

5779	cubic yards excavation, estimated at 17 cents,	982 43
20737	" " embankment " " 10 "	2,07 70
3000	perches masonry, " " " \$3 00	\$9000 00
		<hr/> <hr/>
		21,425 81

Section, No. 2.

WORK DONE.

13677	cubic yards, common excavation,	\$1,094 16
810	" " detached rock,	202 50
4203	" " slate rock,	1,050 75
6552	" " solid rock,	3,079 44
24091	" " embankment,	1,927 28
257	feet cross drains,	449 75
	grubbing and clearing,	145 00
	excavating channel, for creek, estimate	134 90
8	perches of slope wall, "	12 00
		<hr/> <hr/>
		\$8,095 78

WORK TO BE DONE.

20892	cubic yards excavation estimated at 20c.	\$4,178 40
51509	" " embankment 10c.	5,150 9
		<hr/> <hr/>

Total for section No. 2,

\$17,425 08

Section No. 3.

WORK DONE BY THE FIRST CONTRACTOR.

6496	cub. yds. common excavation,	454	72
61	" " detached rock,	10	98
537	" " solid rock,	252	39
6836	" " embankment,	615	24
	Grubbing and clearing,	80	00

WORK DONE BY PRESENT CONTRACTOR.

10562	cubic yards excavation,	840	16
831	" " detached rock,	232	68
4851	" " slate rock,	1,358	28
6501	" " solid rock,	3,250	50
25261	" " embankment,	2,778	71
100	rods grubbing,	200	00
352	feet cross drains,	704	00
		<u>\$10,777</u>	<u>06</u>

WORK TO BE DONE.

7710	cubic yards excavation, estimate at 20c.	1,542	00
56556	" " embankment, 11c.	6,221	16
		<u>\$18,540</u>	<u>82</u>

Section No. 4.

WORK DONE.

48957	cubic yards common excavation,	5385	27
11557	" " slate rock,	2,889	25
89	" " solid rock,	40	05
40946	" " embankment,	5,322	98
373	feet cross drains,	279	75
	grubbing and clearing,	284	00
		<u>\$14,201</u>	<u>30</u>

WORK TO BE DONE.

15726	cubic yards excavation, estimated at	17c.	2,673	42
5387	" " embankment,	13c.	700	31
450	perches masonry estimated	\$2 00	900	00
40	feet bridge superstructure estimated	5 00	200	00

Total for section No. 4.

\$18,675 03

Section No. 5.

WORK DONE.

5991	cubic yards common excavation,	778 83
4337	" " slate rock,	1,301 10
1343	" " solid rock,	671 50
4223	" " embankment,	422 30
	Grubbing,	50 00
		<u>\$3,223 73</u>

WORK TO BE DONE.

23097	cubic yards excavation estimated at 17c.	4,436 49
7672	" " embankment " 10c.	707 20
		<u>\$8,367 42</u>
Total cost of grading,		<u>\$84,434 16</u>

ESTIMATE OF THE COST OF TRANSFERRING AND RELAYING THE
SUPERSTRUCTURE.

1920	rods taken up and hauled over, at \$5 00,	9 600 00
127000	feet mud sills, B. M. at \$10 per M.	1 270 00
11500	locust cross ties, " 70	8 050 00
1920	rods' laying, " \$7 00	13 440 00
	Add $\frac{1}{4}$ mile through Front street,	3 205 84
	Total cost of superstructure,	35 565 84
	Add the grading,	84 434 16
		<u>\$120,000 00</u>

The above is the neat estimate. It will be well to add \$10,000 to cover contingencies, which will make it \$130,000. Interest of the above sum at five per cent, is \$6,500. The annual expense of maintaining the plane will not be much less than double this amount.

It will be necessary to remove the present depot from the head of the plane to the basin.

ESTIMATE OF THE EXPENSE OF REMOVAL.

350000 bricks taken down, removed and rebuilt	at \$5 25 per M.	\$1,837 50
50000 new bricks put up,	11 00	550 00
352 perches masonry,	2 50	880 00
5 platforms removed,	200 00	1,000 00
4 new platforms,	700 00	2,800 00
200 rods rails laid,	4 00	800 00
7000 feet strings, B. M.	20 00	140 00
800 locust sills,	70	560 00
5400 cubic yards rock excavation,	50	2,700 00
725 yards of new tin roof,	90	642 50
780 do old tin roof removed,	10	78 00
		<hr/>
		\$11,984 00
Add ten per cent,		1,198 80
		<hr/>
Total,		<u>\$13 186 80</u>

Survey of a rail way from Downingtown to Chester, which the board directed to be made with a view of ascertaining the practicability of avoiding the Schuylkill inclined plane in this direction, in connexion with the Philadelphia and Wilmington rail road. The survey passes over a country broken up by creeks and ravines, and the grading, as appears from the estimate, will be expensive. The cut through the ridge between Brandywine and Valley creek, three fourths of a mile long, averaging thirty-eight feet deep. An embankment over Valley creek eighty feet deep, about a quarter of a mile long. The bridge over Black Horse run, between Valley creek and West Chester, will be one hundred and eleven feet high, and one thousand three hundred feet long. The cuttings and embankments are heavy through out, and cannot be avoided without crooks and high grades. The distance from Downingtown to the point of intersection with the Philadelphia and Wilmington rail way, near Chester, is twenty-three miles. From the intersection to the corner of Broad and Chesnut streets, twelve and a quarter miles. Whole distance thirty-five and a quarter miles.

A route of this extent to avoid the Schuylkill plane could not be sought after unless with a view of getting rid entirely of the objections which exist against the present road. The business which would be done on the route surveyed, independent of the Columbia and Philadelphia road will never warrant its construction on any plan or profile, unless new discoveries make it preferable to substitute rail ways for the most part in place of common roads—and if made to avoid the Schuylkill plane and be a part of the main line of the Columbia and Philadelphia rail road, no expense should be spared to perfect it in the best practicable manner, by shunning the difficulties which result from high grades and short curves.

TABLE OF GRADES BEGINNING AT DOWNINGTOWN.

EIGHTY CHAINS TO A MILE.

Grade up 30 feet per mile for	2 miles	12 chains.
" down 30 ft.		74 ch.
" up 30 ft.	3 m.	30 ch.
" down 52 ft.	1 m.	13 ch.
" " 30 ft.	3 m.	28 ch.
" " 228 ft.	2 m.	74 ch.
" " 30 ft.	3 m.	57 ch.
" " 844 ft.	3 m.	8 ch.
" " 30 ft.	2 m.	17 ch.

Sum of the 30 feet grades $15\frac{1}{2}$ miles.

Estimated cost of grading as follows, viz :

MILE 1.

			dols. cts.
64,130 cubic yards,	excavation,	at 20 cents,	12,826 00
54,200 " "	embankment,	12 $\frac{1}{2}$ "	6,775 00
120 perches,	masonry,	\$2 00 "	240 00
150 feet,	cross drains,	1 50 "	225 00
100 rods,	grubbing and clearing,	2 00 "	200 00

\$20,266 00

MILE 2.

94,560 cubic yards,	excavation,	at 20 cents,	18,912 00
80,400 " "	embankments,	12 $\frac{1}{2}$ "	10,050 00
440 perches,	masonry,	2 50 "	1,100 00
60 feet,	cross drains,	1 50 "	90 00
320 rods,	grubbing and clearing,	2 00 "	640 00

\$30,792 00

MILE 3.

343,750 cubic yards,	excavation,	at 20 cents,	68,750 00
116,020 " "	embankment,	10 "	11,602 00
250 perches,	masonry,	2 00 "	500 00
140 feet,	cross drains,	1 50 "	210 00
72 rods,	grubbing and clearing,	2 00 "	144 00

\$81,206 00

MILE 4.

156,130 cubic yards,	excavation,	at 20 cents,	31,224 00
166,040 " "	embankment,	12 $\frac{1}{2}$ "	20,755 00
10,876 perches,	masonry,	4 00 "	43,504 00
110 feet,	cross drains,	1 50 "	165 00
164 rods,	grubbing and clearing,	2 00 "	328 00

\$95,976 00

MILE 5.

130,620 cubic yards, excavation, at	20 cents,	26,124 00
25,200 " " embankment,	12 $\frac{1}{2}$ "	3,150 00
120 perches, masonry,	2 50 "	300 00
80 feet, cross drains,	1 50 "	120 00
84 rods, grubbing and clearing,	2 00 "	168 00
		<hr/>
		<u>\$29,862 00</u>

MILE 6.

102,950 cubic yards, excavation, at	20 cents,	20,590 00
6,440 " " embankment,	12 $\frac{1}{2}$ "	805 00
16,907 perches, masonry,	4 00 "	67,628 00
112 feet, cross drains,	1 50 "	168 00
80 rods, grubbing and clearing,	2 00 "	160 00
		<hr/>
		<u>\$89,351 00</u>

MILE 7.

204,070 cubic yards, excavation, at	20 cents,	40,814 00
2,640 " " embankment,	12 $\frac{1}{2}$ "	330 00
310 perches, masonry,	3 00 "	930 00
98 feet, cross drains,	1 50 "	147 00
8 rods, grubbing and clearing,	2 00 "	16 00
		<hr/>
		<u>\$42,237 00</u>

MILE 8.

67,160 cubic yards, excavation, at	20 cents,	13,432 00
47,800 " " embankment,	10 "	4,780 00
220 perches, masonry,	3 00 "	666 00
124 feet, cross drains,	2 00 "	248 00
60 rods, grubbing and clearing,	2 00 "	120 00
		<hr/>
		<u>\$19,246 00</u>

MILE 9.

42,860 cubic yards, excavation, at	20 cents,	8,572 00
39,500 " " embankment,	10 "	3,950 00
1,545 perches, masonry,	3 00 "	4,635 00
66 feet, cross drains,	2 00 "	132 00
48 rods, grubbing and clearing,	2 00 "	96 00
		<hr/>
		<u>\$17,385 00</u>

MILE 10.

84,910	cubic yards, excavation,	at 20 cents,	16,982 00
82,820	" " embankment,	10 "	8,282 00
5,490	perches, masonry,	3 00 "	16,470 00
110	feet, cross drains,	2 00 "	220 00
260	rods, grubbing and clearing,	2 00 "	520 00
			<hr/>
			\$42,474 00
			<hr/>

MILE 11.

60,080	cubic yards, excavation,	at 20 cents,	12,016 00
192,290	" " embankment,	10 " "	19,229 00
3,476	perches, masonry,	3 00 "	10,428 00
94	feet, cross drains,	2 00 "	188 00
20	rods, grubbing and clearing	2 00 "	40 00
			<hr/>
			\$41,901 00
			<hr/>

MILE 12.

68,660	cubic yards, excavation,	at 20 cents,	13,732 00
44,650	" " embankment,	10 "	4,465 00
1,545	perches, masonry,	3 00 "	4,635 00
94	feet, cross drains,	2 00 "	188 00
20	rods, grubbing and clearing,	2 00 "	40 00
			<hr/>
			\$23,060 00
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MILE 13.

60,460	cubic yards, excavation,	at 20 cents,	12,092 00
54,410	" " embankment,	10 "	5,441 00
450	perches, masonry,	3 00 "	1,350 00
200	feet, cross drains,	2 00 "	400 00
80	rods, grubbing and clearing,	2 00 "	160 00
			<hr/>
			\$19,443 00
			<hr/>

MILE 14.

46,670	cubic yards, excavation,	at 20 cents,	9,334 00
45,100	" " embankment,	10 "	4 510 00
3,045	perches, masonry,	3 00 "	9,135 00
120	feet, cross drains,	2 00 "	240 00
160	rods, grubbing and clearing,	2 00 "	320 00
			<hr/>
			\$23,539 00
			<hr/>

MILE 15.

63.880 cubic yards, excavation,	at 20 cents,	12,776 00
53.910 " " embankment,	10 "	5,591 00
4,545 perches, masonry,	3 00 "	13,635 00
130 feet, cross drains,	2 00 "	260 00
60 rods, grubbing and clearing	2 00 "	120 00
		<u>\$32,182 00</u>

MILE 16.

74.310 cubic yards, excavation,	at 20 cents,	14,862 00
114,700 " " embankment,	10 "	11,470 00
4,279 perches, masonry,	3 00 "	12,837 00
120 feet, cross drains,	2 00 "	240 00
88 rods, grubbing and clearing,	2 00 "	176 00
		<u>\$39,585 00</u>

MILE 17.

69,790 cubic yards, excavation,	at 20 cents,	13,958 00
69,180 " " embankment,	10 "	6,918 00
4,612 perches, masonry,	3 00 "	13,806 00
68 feet, cross drains,	2 00 "	136 00
80 rods, grubbing and clearing,	2 00 "	160 00
		<u>\$34,978 00</u>

MILE 18.

92,900 cubic yards, excavation,	at 20 cents,	18,580 00
190,200 " " embankment,	10 "	19,020 00
8,332 perches, masonry,	3 00 "	24,936 00
40 feet, cross drains,	2 00 "	80 00
90 rods, grubbing and clearing,	2 00 "	180 00
		<u>\$62,856 00</u>

MILE 19.

60.040 cubic yards, excavation,	at 20 cents,	12,008 00
58,100 " " embankment,	10 "	5,810 00
400 perches, masonry,	3 00 "	1,200 00
90 feet, cross drains,	2 00 "	180 00
24 rods, grubbing and clearing,	2 00 "	48 00
		<u>\$19,246 00</u>

MILE 20.

40,680	cubic yards	excavation,	at 20 cents,	8,136 00
114,020	"	embankment	10 "	11,402 00
3,068	perches,	masonry,	3 00 "	9,204 00
54	feet,	cross drains,	2 00 "	108 00
40	rods,	grubbing and clearing,	2 00 "	80 00
				<u>\$28,930 00</u>

MILE 21.

65,780	cubic yards,	excavation,	at 20 cents,	17,156 00
131,620	"	embankment,,	10 "	13,162 00
558	perches,	masonry,	3 00 "	1,674 00
100	feet.	cross drains,	2 00 "	200 00
80	rods,	grubbing and clearing,	2 00 "	160 00
				<u>\$32,352 00</u>

MILE 22.

152,380	cubic yards,	excavation,	at 20 cents,	30,476 00
41,000	"	embankment,	10 "	4,100 00
150	perches.	masonry,	3 00 "	450 00
100	feet,	cross drains,	2 00 "	200 00
40	rods,	grubbing and clearing,	2 00 "	80 00
				<u>\$35,306 00</u>

MILE 23.

57,400	cubic yards,	excavation,	at 20 cents,	11,480 00
9,140	"	embankment,	10 "	914 00
1,534	perches,	masonry,	3 00 "	4,602 00
112	feet,	cross drains,	2 00 "	224 00
10	rods,	grubbing and clearing,	2 00 "	20 00
				<u>\$17,240 00</u>

Total cost of grading,

\$879,426 00

Estimate of the cost of laying one mile of double track rail way.

176 tons iron. edge rail,	at \$80 00	14,080 00
2,640 locust ties,	70	1,848 00
1,200 chairs, 20 lbs. each,	80 per chair,	960 00
1½ tons bolts and spikes,	100 00 per ton,	150 00
70,000 feet (b. m.) mud sills,	12 00 per M.	840 00
320 rods laying double track,	4 50 per rod,	1,440 00
Add for grading and ditching,		250 00
		<hr/>
		\$19,568 00
Multiply by the whole number of miles		23
		<hr/>
Total cost of laying 23 miles of rail way,		\$450,064 00
		<hr/>
Total cost of grading 23 miles of rail way,		\$879,426 00
“ “ laying do. superstructure,		450,064 00
Add 1,300 feet bridge superstructure, Black H. run,	at \$12 00	15,600 00
		<hr/>
		\$1,345,090 00
Add 10 per cent. for contingencies,		134,509 00
		<hr/>
Total cost,		<u>\$1,479,599 00</u>

COLUMBIA AND PHILADELPHIA RAIL ROAD,

Is capable of passing almost an infinite amount of business. The heavy engines working upon it will take each, thirty loaded cars over the road at a time, being a gross load of 165 tons, exclusive of the engine and tender, performing one trip a day, or seventy-seven miles. Some of the engines have made their regular daily trip during the season without scarcely a dollar's worth of repairs. The motive power receipts for the past fiscal year, as furnished by the superintendent of transportation, up to about the middle of October, amount to \$123,680 00, and the motive power expenses to \$104,794 37. Showing a clear gain in the motive power department of \$18,885 63. The expenses of maintaining the Schuylkill inclined plane, including the motive power on the level between the foot of the plane and Broad street, from a statement furnished by the superintendent of transportation, for the past year, is the sum of \$22,983 75, as follows, viz :

Rope for plane and fuel for locomotives,	\$7,488 46
Fuel for stationary engine,	4,025 00
Engineers and firemen,	1,457 50
Horse power from Broad street to head of plane during the months of Nov. Dec. Jan'y and Feb'y,	2,576 04
Steam power, on same level, the remainder of the year,	1,581 00
Hands, including managers,	5,855 75
	<hr/>
Total,	<u>\$22,983 75</u>

No accident has happened. The whole operations upon the road have been conducted with the regularity of well constructed machinery; not perfect, but still susceptible of improvement. The facts developed from the performance of the road the past year, prove that the evils which existed heretofore were not chargeable to the road itself. The best horse that walks the earth, if badly managed, may be troublesome and dangerous; if well treated, may be invaluable to his owner.

The summit of the road near the intersection of the West Chester rail way, is 310 feet above the head of the plane, and 294 feet above Downingtown. The summit at the gap is 311 feet above Downingtown, and 323 feet above the basin at Columbia.

The grades to overcome the gap summit, taking them on either side of it, from Downingtown to the summit, and from the Columbia basin to the summit, are as high as the grades to overcome the summit near the intersection of the West Chester road, taking them on either side of it from Downingtown to the summit, and from the head of the plane to the summit, as may be gathered in some measure from the heights given above; which show that the gap summit is higher than that at the intersection of the West Chester road. The curves between Downingtown and the head of the plane are more numerous than on the same extent of road between Downingtown and Columbia. But the radii of curvature of the curves between Downingtown and the head of the plane are not shorter than the radii of curvature of the curves between Downingtown and Columbia. And the distance from Downingtown to the head of the Columbia plane is $48\frac{1}{2}$ miles, and from Downingtown to the head of the Schuylkill plane only $29\frac{1}{2}$ miles—less than two-thirds of the distance. It must appear evident then that engines and cars of capacity and strength sufficient to traverse the road between Downingtown and Columbia, and stand the wear and tear, would equally be capable of traversing the road between Downingtown and the head of the Schuylkill plane. And engines that could pass the summit at the gap, would be able, with as little difficulty, to pass the summit at the intersection of the West Chester road. Engines with heavy trains find more or less difficulty from the slipping of the driving wheels when the rails are slightly wet or covered with frost. But engines have past over the Columbia and Philadelphia road, as an extraordinary performance, with trains of thirty-five loaded burthen cars each, and passed the high grades without difficulty. It is hardly necessary to say that inclined planes should be avoided if practicable at reasonable expense. And it may not be impracticable to avoid the Schuylkill plane with advantage, by diverging from the present road somewhere between the Spread Eagle and the head of the plane. Should no such route be found, and I would respectfully recommend an examination to be made, the capacity of the Schuylkill plane is susceptible of great improvement, by substituting engines at the head of greater power and better adapted for the purpose, and by extending the ends of the rope at the head and foot of the plane to give room for hitching on; and by laying a double track of rails over the bridge now used for

common travelling, to give room for cars at the foot of the plane. The strength of a rope or the weight it will bear with safety in use, taken at one-fourth its absolute cohesion, is ascertained by multiplying the square of its diameter in inches by twenty-two cwt. By this rule a rope two and a half inches diameter will bear a vertical stress on it of 6.87 tons. The inclination of the Schuylkill plane is at the rate of 180 feet in 2640 feet. The same sized rope on this inclination, will, therefore, by the resolution of forces, sustain 100.7 tons ascending and descending at the same time, including the weight of the rope, or the gross load of thirty-six burthen cars. The Portage planes work with double the velocity of the Schuylkill plane. The engines have double cylinders, or are double engines working on the same shaft, with the cranks at right angles, dispensing with the fly wheel, with a hydraulic to check its motion when lowering a train without a balancing train ascending. The machinery is arranged to work with greater expedition, and safety at the same time, than the engines of the Columbia and Philadelphia planes. There are also two engines at the head of each plane on the Portage. In case one of them gets out of order the other is ready for use. This is not the case at the Schuylkill plane. This plane, therefore, is susceptible of vast improvement, as the business of the road may require it, by increasing the power of the engines, and giving room at the head and foot for hitching on. The cost of avoiding the plane by taking off at Downingtown by way of Chester, would be \$1,479,599 00 according to the estimate given in the report of the survey. The grades are heavy, being fifteen and three fourth miles of thirty feet grades. On the present road from Downingtown to head of plane, the sum of the thirty feet grades, is seven miles thirty-nine chains; of twenty-nine feet grades, six miles thirty-nine chains; of twenty-eight feet grades, seven miles sixteen chains. These being the highest grades on this portion of the Columbia and Philadelphia rail road. The interest on the cost of constructing the route by Chester is \$73,979 00. The route down Chester valley towards Norristown, with the history of which the board is acquainted, could not cost less.

Interest on cost of construction,	\$73,979 00
Annual expense of Schuylkill plane,	22.983 75
	<hr/>
Difference in annual cost,	\$50,995 25
Which is the interest of	<u>\$1,019,905 00</u>

The delay is on the canal, on account of the slow rate of speed, not on the Columbia road. It would be better to expend this money, in extending the rail way along the canal, with a view, finally of completing a rail way communication between Philadelphia and Pittsburg. But in no point of view, would it be wisdom to abandon so great a portion of the Columbia and Philadelphia rail way, at present, under the circumstances.

I most respectfully recommend to the board, the following improvements on the Columbia road, to be made next summer, (unless a shorter practicable route may be found, which will avoid the plane,)

viz. The roofing of the Schuylkill plane, and protecting it from the weather;—Filling up under Maul's bridge, with earth: this structure is rapidly decaying; there are now about twenty props under it. It will not be safe longer than during next summer. Laying ten miles of iron edge rails, in place of the wooden track on the eastern division. The part between the foot of the plane, and Broad street, and the stone track at the head of the plane, particularly, are almost in an impassable condition; in all about five and a half miles. There is much of the remainder of the track, if not laid with edge rails, will require renewing with white oak. It will be better to renew at least ten miles of it permanently, with the edge rail at once. There are rails enough on hand to lay three miles, according to an account taken by the supervisor of repairs. The roofing of the Schuylkill plane, will cost twice as much as the roofing of one of the Portage planes, on account of the higher price of materials, and workmanship.

ESTIMATE OF THE COST.

Roofing Plane.

170,000 Bricks,	at \$11 00 per M.	\$1870 00
200,000 shingles, at	10 00 “ “	2000 00
6,000 feet of timber, for plates,	15 per foot,	900 00
86,000 feet of rafters and ties,	10 00 per M.	860 00
2,400 pounds of nails,	7	168 00
90,000 feet of lath,		300 00
200 perches masonry,	1 50	300 00
Add for workmanship.		1,000 00
		<hr/>
		\$7398 00

Filling up Maul's Bridge.

36,000 cubic yards embankment, at \$0 25	\$6.500 00
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Cost of these improvements.	<hr/> \$13,898 00 <hr/>
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Laying ten miles of Rail Way.

450 tons of new rails, at	\$80 00	\$36,000 00
9,000 chairs	70	6,300 00
78,000 bolts and spikes,	04	3,120 00
15,000 locust cross ties,	75	11,250 00
438,000 feet mud sills,	12 00 per M.	5,256 00
3,200 rods of laying,	3 00	9,600 00
10,700 iron keys,	03	321 00
		<hr/>
		\$71,847 00

Add 10 per cent.	7,184 70
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Cost of laying ten miles of rail way,	<hr/> \$79,031 00 <hr/>
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Total cost of these improvements—	<hr/> \$92,929 00 <hr/>
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It is further respectfully recommended to the board, for the better and more complete accommodation of business, at the foot of the Schuylkill plane, to lay a double track of rails over the bridge, now used for common travelling.

Respectfully submitted,

JOHN P. BAILEY,
Engineer.

Report of A. Mehaffy, Superintendent of Motive Power.

To the Honorable the Board of Canal Commissioners.

The undersigned has the honor to submit a report of the motive power department of the Columbia and Philadelphia rail way, for the year ending October 31st, 1837.

In reviewing the operations of the season, it is but justice, in the outset, to say that the use of the road has been uninterrupted, and that its state of repair at all times such as to afford every facility to the agents of the motive power department, except during 22d, 23d and 24th of last January.

On those days the road was completely obstructed by the drifts of an unusually severe snow storm. Many of the deep cuts were wholly filled up, and the road was generally covered with three feet of snow, yet to the surprise of every one and very much to the profit and credit of the State, the whole was cleared off and the road in use in the time above stated.

This was mainly owing to the precautionary measures which had been taken to meet such a contingency.

Snow scrapers, of a new and effective kind were applied, and with the combined force of three locomotive engines to each, soon removed the obstruction.

Before giving the details of the motive power operation, it is also proper to remark, that in March and April, preparation was made for a very large increase of the business of the road, which in common with every other similar calculation on the existing state of prosperity of the country, was not realized. Double the former number of locomotives had been put on with a proportionate increase of hands in every branch of the business. The expenses were swelled up in the same proportion.

The derangement of commercial affairs, however, which occurred in May, at once destroyed all hope of sustaining this enlarged establishment on the road from its own resources. Though this was

soon perceived, yet it was found impossible, at once, to reduce the expenditure to the actual demands of business, without manifest injustice to the hands employed, and, in many cases, without an actual breach of faith. The reduction was therefore necessarily gradual, and it was not till the 1st July that the force on the road was brought down to an equality with the trade. Had it not been for this occurrence, its earnings would have been much greater, or had it been possible to foresee it, the expenditure would have been much less.

Still it affords the undersigned great pleasure to inform the board that the road has paid the interest of its construction, and that the much talked of "Motive Power Fund" has not only sustained itself, (as will be seen by reference to tables A. B.) but has actually realized an excess over expenditure, including all unpaid demands upon it, of \$22,478 90 $\frac{1}{4}$, a sum sufficient to pay seven per cent. for the year on the original cost, (viz: \$326,103 41,) of all the locomotives on the road. With a reasonable increase of business next season, no doubt is entertained of being able to pay even a larger interest on the sum invested in locomotives, and of providing such new ones as may become necessary for the succeeding year, out of the motive power fund.

The undersigned is aware that his statement of the motive power fund may appear to differ from that of the State Treasurer, which is thus explained. That officer has charged upon the motive power earnings of the year just closed, a number of debts contracted previous to its commencement, and which though fairly chargeable upon the general motive power fund, should not, in the opinion of the undersigned, be deducted from the toll of the *present* year, and thus be made to decrease the amount of excess which the operations of the year most certainly have produced.

Statement C. will exhibit the state of the accounts of the undersigned with the State Treasury, both as to the motive power fund, and as to the specific appropriation of 1836-7, for the purchase of locomotives. Under the former head he charges himself with a balance of \$843 61 $\frac{1}{2}$, and under the latter \$340 23.

Here it is proper to state that on the books of the State Treasurer, an unsettled balance of \$11,000, appears against the undersigned on the 31st, of October, 1837.

This sum was drawn from the Treasury in October last, to make the payments due on the 1st of November, (the general pay day, when all the hands receive their money at their stations, without the loss of time that would be caused by attendance at the office.) and, with the exception of the above balance of \$843 61 $\frac{1}{2}$, was accounted for on the 7th instant.

The balance of the locomotive fund just stated, though not settled for with the accountant departments, has been, with \$559 77 of the above motive power balance, making \$1100, actually paid to McClurg, Wade, & Co. of Pittsburg, for two tenders belonging to the locomotives "Pittsburger," and "Backwoodsman," built by that firm, but not included in the contract for those locomotives. The specific fund given by the Legislature for the purchase of locomotives, would

have been sufficient to meet this item, it is understood, had it not been for the existence of a balance due the New Castle manufacturing company for locomotives, which was unknown, and therefore not included in the estimate submitted to the board in the report of last year. It is now respectfully suggested that a specific appropriation of \$559 77 be requested to meet this deficiency, so that the account may be closed. It will, however, be perceived, that if the \$1100 00 thus paid be deducted from the aggregate of the two balances against the undersigned above named, the real balance in his hands will be \$274 84 $\frac{1}{2}$.

Statement D. will exhibit the names of all the agents employed on the road, in the motive power department during the year, with their duties, time of service, daily pay, and amount paid each. Those marked with a star have either been discharged or promoted during the year, and are not now in the employment of the state in the capacities set forth in the list.

While speaking of the earnings and expenses of the motive power department, it may not be amiss to go into a statement to show that the rail way toll received during the year, after paying all expenses of repair and supervision, will fully pay the interest on the whole original cost of construction of the road, which will be found by reference to table A.

To this general view of the condition and earnings of the road, it is not improper to add, that during the year, so far as has come within the knowledge of the undersigned, not a single life or limb has been lost by the fault or neglect of any of the engineers or public agents; nor has there been a car, axle, or wheel broken by the fast running or other imprudence of any of the engineers. In fact the locomotive and stationary engineers of the road, for professional skill, and high moral character, will compare with any class of men in any branch of business, in any part of the country. The uniform absence of accidents of all kinds, and the uninterrupted use of the road, and of the engines, at the planes, which have not lost a day during the whole year, are the shortest reply to the attempts that have been made to disparage both, and afford the best assurance of safety to the travelling public that can be made.

It is not denied that accidents have occurred during the season, and some of them of a distressing kind, but it is fearlessly asserted that all have been produced by the negligence or temerity of the unfortunate objects. In most instances life has been lost, or endangered, by the culpable and unnecessary tarrying of persons in taverns, after the repeated ringing of the bell for the departure of the train, and by the consequent ineffectual attempt to enter the cars when in motion. An instance of this kind is of very recent occurrence. In others, the rash attempts to jump off while the train is in rapid progress, or obstinate disregard of danger manifested by persons in obstinately remaining on the track of an approaching engine, has, and while such practices are persisted in, will, cause their own destruction. From these and such like causes, accidents have occurred, but when the number of persons travelling, and frequenting the rail road are taken

into account, the wonder is not that so many are hurt, but that so many escape.

It is confidently believed that fewer lives are lost on this rail road than would be if the same number of persons were carried the same distance in stages, or any other means of conveyance, heretofore in use. Not less than one hundred thousand persons have travelled on the road during the year, either as through or way passengers, exclusive of officers, agents, &c. It is believed that only five lives were lost, being one in twenty thousand, and not more than ten persons seriously injured, or one in ten thousand.

It is remarkable further, that all the persons killed or hurt were not regular pay passengers, but persons either lounging about the road, or attempting to get on or off the cars without the knowledge of the engineer or agents; consequently the proportion of casualties among passengers would be much less than that above stated, and probably would not exceed one in 50,000 killed, and one in 20,000 hurt; a degree of safety in comparison with the amount of travel and ordinary risk and danger of journeying, believed in no case to be exceeded. In fact it is not recollected that a single passenger was hurt who remained in his seat while the train was in motion, and had re-occupied it before starting again. It would add much to the credit of the road as well as to their own safety, if the practice of hastening into the taverns before the trains become stationary, and of tarrying there after they are in motion again, were discontinued by passengers; certainly as accidents do happen from this cause, the undersigned feels himself justified in placing the blame to the right account.

It is not recollected that a single instance occurred during the whole year, in which the passengers were delayed for want of steam; so careful have been the engineers, and so superior the engines used. It has, it is true, sometimes happened, that owing to a peculiar damp state of the weather and of the rails, locomotives failed to ascend the heavy grades of the road with that facility which is experienced under other circumstances. But this result, though frequently attributed to the engineer or his engine, is not fairly chargeable to either. A heavy rain which entirely washes off all dust and oil from the rail, presents no difficulty; but a slight shower or a general dampness of the air together with the dust and oil which accumulate on the rails from day to day, prevents that adhesion and close contact between the wheel and rail so necessary to traction. A remedy for this obstacle has been recently applied, and has proved quite effectual. Sandboxes have been placed in front of the driving wheels which can be made to discharge their contents at pleasure by means of a tube extending close to the rail, so as to create a sufficient degree of grit to overcome what engineers call the "greasiness" of the rail.

These remarks in defence of the conduct of the engineers, and of the general safety of the road, have been made necessary by the entire want of support which both have experienced at the hands of the Pennsylvania public. In other states, a *state* work generally receives a fair portion of encouragement and credit from citizens; at least no unnecessary attacks are ever made upon it, and its defence is

always more readily entered into than its crimination. Such has not been the treatment extended to the Columbia and Philadelphia road, and this has made this defence, which, under other circumstances, would have come with a better grace from some other quarter, not only justifiable but necessary.

Agreeably with the resolution of the board of June 16th, 1836, twenty new locomotives have been brought on the road within the year. The whole number is now forty.

The whole number placed upon it since its opening is fifty, of which two were sold as was stated in last year's report. One, the "Wisconsin" has been taken to Clarke's Ferry, and adapted to the purpose of propelling the tow-boat at that place; and seven have been sent to the Portage road by order of the board. Of the forty now on the road the three British engines, "John Bull," "Albion," and "Atlantic," are worse than useless, on a long road with short curves, steep grades, and a part of it composed of continuous stone sills, and another part of mere wooden sills with flat rails.

These engines, it is believed, would suit a short level road, and will be offered for sale when money again becomes plenty. There are also four of the American engines, viz: "William Penn," "America," "Planet" and "Columbus,"—the first built by Long and Norris—the second by C. Sellars & Son, and the two last by the New Castle manufacturing company, which have not been used during the year. They were built before the very recent improvements were introduced in the construction of locomotives, and will require an expenditure which the undersigned would not recommend, to adapt them to the present wants of the road. The "William Penn" alone requires to be remodeled at an expense of \$3,000, and would even then be of the lighter class. The condition of those four locomotives is respectfully submitted to the board, that such order may be taken with respect to them as will promote the public interest.

Statement E. and F. will exhibit the names, builders, commencement of running and performance of all the engines on the road, and the cost of such as were purchased during the past year, with remarks as to their condition and position at this time.

The undersigned does not wish to become the advocate of any particular kind of engines, but a reference to the tables just named will conclusively show that the heavy locomotives put into operation during the past season, have performed nearly double the amount of work which ever was obtained from those of the lighter class, though their original cost is only one-seventh, and the fuel used one-third more.

As an additional and strong reason for the use of the best kind of locomotives, it may be stated that, taking into account the increased weight transported with the same number of hands and with a very small increase of fuel, transportation can be accomplished for fully one-third less cost to the State than could be done with the former light and insufficient engines. The heavy locomotives now used for the transportation of freight are capable of drawing thirty-five cars, each, with a load of three tons or one hundred and five tons exclusive of the

cars, engine and tender. If their weight be added, the whole will be one hundred and ninety tons, over a road with only one short level, and with grades running up to fifty feet in the mile. It will be remarked that according to the best authorities on the subject, a load of one hundred and ninety tons on a grade of fifty feet, is equal to seven hundred tons on a dead level; and, if ever the "Warren grade" should be dispensed with by the avoidance of the Schuylkill plane, and the "Gap" grade decreased, there would be no limit in practice to the loads that could be hauled.

It will be perceived, by reference to table F. that the average number of cars to each engine, actually hauled during the season, falls far short of the number just given. This is owing to the irregularity and decrease of business which prevailed, and to the rule which, for the accommodation of the trade, was adopted of starting a train whenever one of sufficient size to justify the expense had accumulated, without delaying and increasing the expense of the transporters by waiting for a full one.

The actual cost to the State, of transporting a ton of freight, has been frequently inquired. From the closest calculation that has been made, it would seem that the expense of transporting one ton one mile, in a train of twenty loaded cars, would be about eight mills, exclusive of the repairs, wear and tear of engines, and supervision. The State now charges twelve mills, allowing only four mills for these expenses and all other contingencies.

It is not generally known that the tolls on the Columbia and Philadelphia road are lower than on any other in the Union, but such is the fact.* This, it is presumed, is the true policy of the State, and should not be departed from, except for the single purpose of making the income cover the expenditure, should it ever fail to do so. No change is now necessary for that purpose.

The whole amount of toll received by the State on each passenger from Columbia to Philadelphia, distance eighty-two miles, is \$1 74, that is, allowing fifty persons to each eight wheel car. The rail road and motive power toll, exclusive of the car, is \$1 64 or two cents per mile.

There are thirteen rates of rail road toll for the different articles, chargeable on this road; the average is nine mills per thousand pounds, exclusive of six mills per thousand pounds for motive power, and two cents per mile for the car. Allowing each car to carry 6000 pounds, the whole toll received by the State from Columbia to Philadelphia, distance eighty-two miles, is three dollars per ton of merchandize, or fifteen cents per cwt.

*On the Baltimore and Ohio rail road,

for passengers per mile,	3	cts.	For goods, per ton per mile,	4½	cts.
Baltimore and Washington, per mile,	6	"	"	"	4 "
Winchester and Potomac,	"	6 "	"	"	7 "
Portsmouth and Roanoke,	"	6 "	"	"	8 "
Boston and Providence,	"	5 "	"	"	10 "
Boston and Lowell,	"	3½ "	"	"	7 "
Mohawk and Hudson,	"	5 "	"	"	8 "
Petersburg,	"	5 "	"	"	10 "

The only alteration which now seems necessary, is a reduction of toll on the article of domestic spirits. The rate upon it is so high as to exclude it from the rail road, and make it the interest of dealers to transport it in wagons to market. A reduction of this toll would, beyond a doubt, add to the profits of the road.

Table G. shows that the whole cost of repairing all the engines on the road, during the year, only amounts to \$18,035 93, which is little more than half the previous year's expense.

This decrease is mainly owing to the use of the heavy substantial engines now on the road, and which, if the true interest of the State be attended to, will exclude all others. The passenger engines of this construction, but of a lighter class, have been running all season with scarcely any repair, and have rarely lost a trip; one instance, it is confidently believed, excels any thing on record, of the performance of "wood and iron." The engine "Paoli" has run one hundred and seventy-five successive trips of seventy-seven miles each, equal to thirteen thousand one hundred and seventy five miles, without a dollar's worth of repairs. In making this remark, it is not, by any means, intended to deprive the engineer in charge of her of the credit justly due to his unremitting care and knowledge of his business; nor is it desired to distinguish the "Paoli" or its engineer at the expense of the other engines and locomotives. The only object is to give one instance of good performance, where all have done well, and to show what can be done with good machines, and the right kind of men.

Table H will show the cost of the repairs of locomotives during the year, at job prices, amounting to twenty-five thousand two hundred and eighty-nine dollars and six cents, or about forty per cent. beyond the actual cost in the State shop.

This abstract is taken from an account current kept by the superintendent of machinery, against each engine, with a view of deciding the much discussed question, whether the State loses or gains by making her own repairs. The result is quite decisive, even without including the loss of time, and the expense of carriage consequent upon sending the engines to be repaired at a distance.

In this connexion it is necessary to allude to the speed established on the road. It has been restricted, during the season, to fifteen miles up grade and twelve down for passenger, and to twelve up and ten down for burthen trains.

The advantages resulting from this arrangement are now most obvious. A saving of fifty per cent. in the wear and tear of the locomotives and road has taken place. The safety of travellers is increased four fold. The owners of burthen and passenger cars have saved at least seventy-five per cent. in repairs. Very few cars now break down, and even these are owing to want of attention to their state of repairs, by those having the care of them.

It is not denied that some discontent has existed at the low rate of speed on the road. But when it is known that the trip of eighty-two mile is now made in precisely the same length of time (viz: six and a half hours, including all stoppages consequent to taking in fuel and

water) as when a high rate was permitted, the objection falls to the ground. Within the last month the undersigned visited some of the most frequented roads in this part of the Union, for the purpose of contrasting their operations and regulations with the one under his charge, and the result, so far as speed is concerned, was decidedly such as to convince him of the propriety of the present arrangement. Without wishing to disparage any, he is satisfied that, though more parade may be made by others, as great a degree of safety is not accomplished, nor as great an amount of work done. On other new roads of short extent, large curves, low grades, and mere *passenger* business, high speed may for a time be indulged in. But on the Columbia and Philadelphia road of eighty-two miles in length, curves of as small a radius as five hundred feet, a grade rising to fifty feet in the mile, and an immense mixed business of passengers, merchandize, lumber, produce, coal, &c. &c. it is inadmissible. Other roads frequently pass through a barren or thinly peopled country, but on this the engineer must be continually on the look out for obstructions caused by cars, people, carriages at crossings, cattle &c. &c. The very idea of whirling a passenger train of six long cars, and an immense burthen train of forty cars, past each other at the rate of sixty or seventy miles an hour is frightful, and the practice on a short curve would be most dangerous.

During the year the decreased business of the road was transacted with ten engines, and the number will be further decreased when the canals are closed. Eight will then be quite sufficient. The others either are or will be put in repair during the winter, for the spring trade, and it is believed will be sufficient for that purpose.

Application has been made by the superintendent of the Portage road, for an additional number from this road. It will be impossible, without risk of crippling its operation, to spare him any, unless he can use the American engines before alluded to. Perhaps, on the short levels and large curves of that road they can be advantageously employed.

During the year the intention of placing State agents on the passenger trains, explained in the last report, has been carried into effect with the most gratifying success. Four have been employed; that is, one to each passenger train. At first, some dissatisfaction prevailed among the passenger companies and their agents. This has now worn off, and the former admit that the arrangement is beneficial by establishing a check on their agents. Certainly it has proved highly advantageous to the travelling public, and the State. The presence of the agent gives regularity and promptness to all the movements of the train, and confidence to the passengers in its good order and safety. He also takes an account and makes a return of the number of passengers carried, and regulates the speed and stops.

Though this agency has certainly increased the amount of revenue to the State during the year, far beyond its expense, yet much remains to be accomplished.

Table I. will show the amount of passenger toll returned to the collector at Philadelphia, by the agents of the three passenger companies on the road during seven months, and also the amount with

which they would be charged if the return of the State agents were to be adopted. From this it will appear that the latter exceeds the former \$1,627 99, and that the difference on the whole road, for one year, at all the collectors' offices, in the same ratio, would be \$7,640 73. This is too great a loss to be submitted to without an attempt to prevent it. Part of the difference, no doubt, arises from the fact that the State agent returns all the persons who enter the train, without distinction, and the company agents, by an old but wrong practice on the road, allow many persons to pass free, such as share holders of the different passenger companies, transporters of all kinds and their agents, though not connected with the passenger department, keepers of public houses along the road, and all persons to whom passenger companies give free permits. This practice it will be necessary to prevent, and to confine the privilege of free transit to the officers of the different companies doing business on the road, or their agents, while actually engaged in the discharge of their duties as such.

But the whole difference does not arise from this cause; it will be perceived that on reference to table I. that the difference between the aggregate reports of D. Leech, & Co's agents, and those of the state, are much less in proportion, than in the other cases. This is owing it is believed, to the fact, that the agents of the latter company are compelled by their employers to keep a book, in which they are required to register the names of all persons travelling in their line. It is suggested to the board, whether it would not be proper to compel the companies to settle according to the report of the State agents, acting under oath. Instances have recently been made known of forgetfulness, or worse, on the part of agents, which have deprived both the State and the company of a portion of their dues. If the report of the State agents, were to fix the amount of toll on each trip, this would be avoided and justice would be done to both parties.

The success of the State agents on passenger trains, has been so decisive, that it is now intended, also, to place similar officers at a lower salary, on the different burthen trains. An experiment of this kind has recently been made, and has fully succeeded.

Two agents were started, one from each end of the road, for a number of days in succession, with burthen trains. Besides, the regularity given by their presence, to the movements of the train, the amount of passenger toll returned, is three times as much as the same trains used to return; and the excess is more than double the pay of the agents. The saving to the state will be hereafter much increased, even beyond this amount, when agents are placed on all the trains, because, the presence of the agents on one train, and not on the rest, now necessarily sends most of this kind of custom to those without agents. But if the whole had them, all who travel as burthen car passengers would be compelled to pay as such, or enter the passenger trains.

Much anxiety has been manifested for the introduction of mineral coal, as a fuel to generate steam on the road. All the engines now in use, are adapted to the use of bituminous coal, and that kind of fuel partly coked, and partly uncoked, will be used for the transportation of

passengers next season. Heretofore, it has not been introduced, because it could not be provided at a less cost than wood, and the operations of the road being conducted with perfect certainty by the use of the latter, it was not thought advisable to hazard its reputation for the sake of a profitless experiment. Recently, the operations of the Philadelphia gas company, have reduced the price of coke from eighteen to ten cents a bushel, and have made the change from wood to bituminous coal, a matter of economy, and of its success there can be no doubt.

The use of anthracite coal, has no where, within the knowledge of the undersigned, been so successfully introduced as to warrant him in incurring much expense in the attempt to perfect it. An experiment was lately made on the road, to show that it was usefully practicable, but with little success. It was impossible to keep up a fire for any length of time, so as to convey a full train without the aid of wood to produce a blaze. Much has been said as to the use of this kind of coal by a southern company, but from enquiry on the spot, the undersigned is fully of opinion that the kind of engines there used, would neither suit our road in point of performance, or cost of repairs. Neither would it be advisable to adopt as a successful experiment, a project which would probably not be now persevered in, were it not for the loss which would follow the abandonment of the engines on hand, and only fit for this kind of fuel.

The undersigned is not opposed to the use of anthracite coal, but, as a public officer, he does not deem himself at liberty to incur heavy expenses, and much responsibility in experimenting on a subject not absolutely necessary to the good of the road, however grateful it might be to the feelings of the State. Every experiment on the subject, must be borne out of the motive power fund, and past experience has taught him to place as few burthens as possible on it.

All experiments by the officers of the road, for mere experiment sake, also take time and derange its regular business. Still, the subject should not be lost sight of. It is, therefore, respectfully recommended to the board, to submit the question to the Legislature, whether a liberal reward offered to individuals for the successful introduction of anthracite coal, as a generator of steam in locomotives, would not be the cheapest and speediest means of accomplishing this desirable result. This would at once excite interest in the right kind of persons, and would induce engine builders, who alone can accomplish it, to undertake the matter in earnest.

During the season the use of horse power on the level, from the foot of the Schuylkill plane to Broad street, was discontinued, and two locomotives were substituted. The saving to the State in one year will be \$6,444 50. The number of cars passed in the year was 37,555, which, at a reasonable calculation, would cost \$15,022 by horse power. The cost by steam, including all expenses for the same time, would be \$8,577 50, which will give the above saving, without taking into account the saving in time, and increased certainty and facility to the transporting public. It will also be recollected that the cost of transportation by horse power increases in exact pro-

portion with the increase of business, but that such is not the case with regard to steam. The power now on this level will pass double the present amount of trade without any additional expense, except in the single and small item of fuel.

To complete the accommodation of this change to all parties, it became necessary to alter the location of the collector's office and weigh scales from their former inconvenient situation. They are now at the intersection of Callowhill and Broad streets, the chief point of business on that end of the road, and add very much to the comfort and convenience of all. No car now passes upon the road from the city without being first weighed. This was not always the case before the change, much to the loss of the State. Probably the cost of the change has been already realized in the tolls thus saved.

The Schuylkill plane still continues to be a heavy cost to the State, as will be perceived by reference to table K, and of delay to the passengers and goods; many improvements in its management have been introduced, so as to lessen the evil as much as possible, but its avoidance would be of exceedingly great advantage to the public works. The views presented on this subject in last year's report are still unchanged, and the hope is expressed that the plane will be avoided as soon as the resources of the State will justify the undertaking.

The plane at Columbia would have been dispensed with by the opening of the ensuing spring trade, if the necessary funds had been provided last winter. Should an appropriation be made early in the approaching session of the Legislature, this most desirable object may still be accomplished by the first of July next, and will much promote the usefulness of the road, and the convenience of trade, besides effecting an annual saving to the State of \$17,400.

Running water was procured the 1st of August at Lancaster, from the corporation of that city, on reasonable terms. Twenty cents are paid for each engine supplied, which is less than the expense of pumped water, besides the advantage of being enabled to fill the tanks in one third of the time formerly occupied, and having water free from all sediment injurious to the boilers. The contract on this subject has been submitted to, and approved by the board.

Leaman's station is now the only important one on the road unsupplied with running water. This point is one of great importance, being midway between Parkesburg and Lancaster, and cannot conveniently, be passed by any engine without a supply. Measures have, therefore, been taken, and will soon be perfected, it is hoped, to facilitate the business of the road, by obtaining pure running water here also.

The arrangements suggested in the last report, relative to the State depot and machine shop at Parkesburg, have been completed, and have added very much to the convenience and usefulness of that establishment. The additional buildings accommodate twelve engines, and there is ample and safe shelter now at the different points of the road for all the locomotives belonging to it. The only addition, at present, necessary to complete the establishment, is a house for the

superintendent of machinery. All the officers and workmen at the depot, are supplied with houses by the State, they paying interest on the cost as rent. This arrangement is highly advantageous to the Commonwealth, as it keeps the men on the spot, and avoids loss of time. Mr. Brandt now occupies a small house, originally intended for one of the hands. The cost of the house and lot would not exceed \$2,500, which appropriation is most respectfully and earnestly requested.

Demands have been lately made by the owners of the property, at some of the water stations, for a compensation for the use of the ground occupied by the wood belonging to the State. It is suggested that the proper officer be empowered, either to rent, or purchase the necessary lots for this purpose, as it is presumed that the State does not desire to occupy private property for nothing.

An additional sideway at Lancaster, for the accommodation of the passenger trains, has become necessary, in consequence of the going into operation of the Harrisburg and Lancaster rail road, and the large business necessarily transacted in the circumscribed space at the city water-station. The siding should extend from North Queen street towards Duke street, along the north side of the present track. Its construction would leave both main tracks completely free for the use of the burthen trains, and would much conduce to the safety and convenience of the passengers. The siding cannot long be dispensed with, and will cost much less now, than hereafter, when the ground which must be occupied will have been built upon and improved.—About \$4,000 would cover the expense.

The operations of the Lancaster and Harrisburg rail road, caused some confusion on that portion of the State road near the point of intersection, during the first months after the opening of that road. It soon became apparent that no degree of order or good feeling could be preserved, unless the officers and engineers of each road were confined to their own limits. It was the wish of the officers of the Harrisburg company, that their locomotives should be permitted to pass from the point of junction into the city of Lancaster to the water station, there to take up and leave the Harrisburg cars. For a while this was allowed, but the collisions and confusion produced by engines subject to two different sets of regulations, and run by engineers independent of each other, and of a common control, meeting on such a limited space as the city water station affords, soon made it necessary to withhold the privilege. The loss also to the State of toll on the mile of road from the water station to the junction, was a sacrifice which it was not thought just to make. Another strong reason against any connection in business that could possibly be avoided, was the fact that all collisions and delays in changing from the State to the company's locomotives, and *vice versa*, occurring as they necessarily must, upon the State road, were charged by the travelling public upon the officers of the latter, and thus injured the reputation of the road. Under these circumstances, all privilege on the State road to the company were denied, and the cars to and from Harrisburg are now to be taken up and dropped at the junction, by the

State locomotives, in the same manner that burthen or other cars are left at and received from the other intermediate points on the road.

It does not seem as if the State were bound to afford any unusual facilities to the road in question, particularly when the loss of toll caused by its existence is known. On the twelve miles of State road from Lancaster to Columbia, nearly deprived of passengers by this road, in seven months of the past year, the loss of toll was \$11,978 34, which, in the same proportion for the whole year, would be \$20,534 29. If to this be added, the loss on twenty-eight miles of canal from Columbia to Harrisburg, not less than \$10,000, per annum, the whole loss to the State, caused by the present mere passenger business of the company road, will be \$30,000 a year; and this will be vastly increased when the road is opened for the transportation of freight.

Before closing this report, the undersigned would most earnestly second the request, which, it is understood, the chief engineer and the supervisor of the road have made relative to the renewal of the eastern twenty-two miles of the north track. That portion of the road can hardly be kept in passable order during the ensuing year, and if not now thoroughly repaired, will be impassable at the commencement of the next. An early appropriation to this object, would enable the supervisor to accomplish most of the work during the coming winter, when it would cause little interruption to business, and would add much to the convenience and safety of the motive power department next summer. It is known to all conversant with the subject, that the cost of keeping locomotives and cars in repair, is much less on a road in good than in bad order.

A small appropriation for ropes on the inclined planes, will be necessary, in addition to the balance of the former appropriation for that purpose now in the treasury—four thousand dollars, will be sufficient. A further appropriation of five thousand dollars will also be required for planing machines, and other machinery, which will be indispensable.

Table L. will show the number of passengers transported on the Columbia and Philadelphia rail road, and the amount of the rail road and motive power toll received at the different offices during the year.

Table M. will show the whole amount of appropriation asked for in this report.

The undersigned has thus gone into a full detail of all matters connected with the road under his charge. Perhaps he has burthened the board with a longer report than at first sight may seem necessary; but he has viewed the operations of the past as of much importance. So far as he is capable of conducting it, they formed an experiment to ascertain whether so complicated a concern as an extensive rail road, with every variety of business, can be as usefully, safely and cheaply managed by the State, as by a company, or an individual. He was aware that this view was taken by others, as well as himself; it therefore became necessary to go fully into detail. The year thus important to the State, and to his own character as an officer, is now closed. The result is a firm conviction that the same

honesty, industry and intelligence, which give success to private enterprize, will have a like effect on the administration of public affairs; and that the Columbia and Philadelphia rail road, though it has been one of the most expensive divisions of the public improvements, can be made, even in the hands of the State, useful and profitable as any.

Among the most cheering occurrences of the season, were the frequent instances of merchandize purchased in the cities of New York, and Baltimore, passing over this road on its way to the west. Thus already conceding to the Pennsylvania works that advantage in trade, of which nothing but our own neglect can ever deprive them.

All of which is respectfully submitted.

A. MEHAFFY,

Sup't Motive Power, Col. and Phil'a R. R.

RAIL ROAD OFFICE, }
Lancaster, Nov. 7, 1837. }

A.

Statement showing that the rail road toll is equal to the interest on the original cost of the road.

Amount of rail road toll received from		
1st Nov. 1836, to Oct. 31st, 1837,	\$211,324	16
Deduct repairs and supervision,	59,024	95
	<hr/>	
Clear earnings of the road,		\$152,299 21
Original cost of the road,	\$3,353,127	42
Deduct from this sum premium 14	466,637	83
per cent. in consideration of which	<hr/>	
the state agreed to pay 5 per cent.	\$2,886,489	59
instead of a lower rate of interest		5
without premium,	<hr/>	
		143,324 47
	<hr/>	
Balance on 5 per cent. according to this calculation,		\$8,974 74
Or, if the premium is not deducted,		
the neat earnings of the road being		152,299 21
4½ per cent. on \$3,333,127 42 is		149,990 73
	<hr/>	
Balance over 4½ per cent,		\$2,308 48
	<hr/>	

B.

Statement of the Motive power toll and expenditure.

Amount of motive power toll earned and paid into the state treasury between the 1st Nov. 1836, and 31st Oct. 1837,	\$137,338 67
Amount paid for motive power operations during same period,	103,959 76½
Amount of debts contracted in the same time,	14,000 00
	<hr/>
	\$117,959 76½
Deduct stock on hand, such as fuel, iron, oil, &c.	3,100 00
	<hr/>
	114,859 76½
	<hr/>
Actual excess over expenditures,	<u><u>\$22,478 90½</u></u>

C.

Statement showing the Superintendent's account with the State Treasurer.

MOTIVE POWER.

Amount drawn from State Treasurer,	104,794 37½
Amount expended from Nov. 1, 1836, to Oct. 31, 1837,	103,959 76½
	<hr/>
Balance in hand,	<u><u>\$834 61½</u></u>

LOCOMOTIVES.

Amount drawn from State treasury,	173,490 23
Amount expended,	172,950 00
	<hr/>
Balance in hand,	<u><u>\$540 23</u></u>

D.

Statement showing the names, duties, time of service, daily pay, and amount paid each of the Motive Power Agents on the road during the year.

Names of Agents.	Duties.	Time of service.	Daily Pay.	Amount paid each.	Aggregate.
PARKESBURG SHOP.					
John Brandt,	Master Machinist.	365 days	4 00	1460 00	
*John W. Hunter,	Foreman.	174	2 50	435 00	
do.	"	12	1 75	21 00	
James T. Paxton,	Manager.	77	2 00	154 00	
do.	"	131	1 50	196 50	
*George Gregory,	Smith,	184 $\frac{1}{2}$	2 33	429 88 $\frac{1}{2}$	
do.	"	26	1 75	45 50	
George Hocksworth,	"	75 $\frac{1}{2}$	2 00	151 00	
do.	"	103	1 75	180 25	
do.	"	127 $\frac{1}{2}$	1 50	191 25	
Henry Tallman,	"	74 $\frac{1}{2}$	1 84	137 08	
David Pollock,	"	100 $\frac{1}{2}$	1 66 2-3	167 49	
*Joseph Gregory.	"	146	1 50	219 00	
*Lewis Glasby,	"	47	1 35	63 45	
*Rudolph Graft,	"	50 $\frac{1}{2}$	1 33 $\frac{1}{2}$	67 33 $\frac{1}{2}$	
*William Stewart,	"	103 $\frac{1}{2}$	1 33 $\frac{1}{2}$	138 00	
Thomas Hocksworth,	"	182	1 16 2-3	212 33 $\frac{1}{2}$	
*John Oliver,	"	154	1 16 2-3	179 67	
*Patrick Smith,	Shop hand.	85	1 50	127 50	

*James Doherty,	Shop hand.	3 $\frac{1}{2}$	1 15	4 02 $\frac{1}{2}$
Benjamin Franck,	"	182	1 16 2-3	212 33 $\frac{1}{2}$
Thomas Hocksworth,	"	57 $\frac{1}{2}$	1 00	57 50
*James Armstrong,	Fireman.	181	1 16	209 96
James D. Brinkerhoof,	Boiler maker.	82 $\frac{1}{2}$	2 33	192 22 $\frac{1}{2}$
do.	"	109 $\frac{1}{4}$	1 50	163 87 $\frac{1}{2}$
Wm. Hardman,	Machinist.	77	2 00	154 00
do.	"	79	1 84	145 36
do.	"	26	1 75	45 50
do.	"	24	1 50	36 00
David Pollock,	"	48 $\frac{1}{2}$	2 00	97 00
do.	"	78	1 50	117 00
*Alexander Harvey,	"	59	2 00	118 00
Michael Bannon,	"	177	2 00	354 00
do.	"	126 $\frac{1}{2}$	1 50	189 75
John Watts,	"	147 $\frac{1}{2}$	2 00	295 00
do.	"	128	1 50	192 00
*George A. Milner,	"	170	2 00	340 00
do.	"	46	1 50	69 00
*James W. Hardman,	"	87 $\frac{1}{2}$	2 00	175 00
*Phelps Mix,	"	86	2 00	172 00
*John Lenher,	"	70 $\frac{1}{2}$	2 00	141 00
*Seymour Bennett,	"	116	1 83	212 28
*Edward D. Rice,	"	138	1 75	241 50
*Samuel Hardman,	"	174 $\frac{1}{2}$	1 66 2-3	290 83
do.	"	44 $\frac{1}{2}$	1 50	66 75
*Beale Few,	"	22 $\frac{1}{2}$	1 50	33 75
James Bowman,	"	26	1 66	43 16

D.—CONTINUED.

Names of Agents.	Duties.	Time of service.	Daily Pay.	Amount paid each.	Aggregate.
James Bowman,	Machinist.	4 days	\$1 50	\$ 6 00	
David Ralston,	"	164 $\frac{3}{4}$	1 37 $\frac{1}{2}$	226 53	
do.	"	117 $\frac{1}{2}$	1 25	146 87 $\frac{1}{2}$	
*John Rooke,	"	19 $\frac{1}{2}$	1 25	24 37 $\frac{1}{2}$	
Charles Woods,	"	57	1 00	57 00	
Joseph Hughes,	Wood worker.	178 $\frac{3}{4}$	2 00	357 50	
do.	"	127 $\frac{1}{2}$	1 50	191 25	
John Philips,	"	174	1 50	261 00	
do.	"	112	1 25	140 00	
Hiram Baldwin,	"	273 $\frac{3}{4}$	1 50	260 62 $\frac{1}{2}$	
do.	"	120 $\frac{1}{2}$	1 25	150 62 $\frac{1}{2}$	
Isaac Lewis,	"	175	1 50	262 50	
do.	"	125	1 25	156 25	
*James Armstrong.	Watchman.	30 n.	25	7 50	\$11,193 07 $\frac{1}{2}$
SCHUYLKILL DEPOT.					
*Edward H. Brown,	Foreman.	165	2 00	330 00	
*George Eagles,	Smith.	130	2 00	260 00	
*George Nixon,	"	185 $\frac{1}{2}$	1 60	296 80	
*Isaac White,	"	42	1 60	67 20	
*Samuel Watson,	"	8	1 50	12 00	
*John Smith,	"	39	1 33 $\frac{1}{2}$	52 00	
*James Fullerton,	"	8	1 12	8 96	

Ludwick Young,	52	1 12	58 24
*And'w Vancleve,	130 $\frac{1}{2}$	1 12	145 88
*Jacob Arman,	78 $\frac{1}{2}$	1 12	87 92
*Isaac Norcross,	38	1 12	42 56
*Augustus Thompson,	3	1 66 2-3	5 00
*David Belvan,	65	1 25	81 25
*Robert Cunningham,	3	1 25	3 75
do.	28	1 00	28 00
*David Pearson,	18	1 00	18 00
*David Belvan,	53 $\frac{1}{2}$	1 00	53 50
*Henry Wolf,	48	1 12	53 76
*Ludwick Young,	135 $\frac{1}{2}$	1 00	135 50
*David Rowe,	70	1 50	105 00
\$1,845 32			
COLUMBIA DEPOT.			
George Eagles,	52	2 00	104 00
do.	131	1 75	229 25
*Isaac Reifsnnyder,	123	1 83 $\frac{1}{4}$	225 50
*Henry Wolf,	26	1 50	39 00
Henry Kamerer,	291	1 50	436 50
*Thomas King,	138 $\frac{1}{2}$	1 50	207 75
Daniel Stape,	140	1 50	210 00
do.	107	1 25	133 75
*Patrick Smith,	21	1 50	31 50
*Elisha Hamil.	8	1 20	960
\$1,636 85			
SCHUYLKILL PLANE.			
John Alter,	345	2 50	862 50
Manager.			

D.—CONTINUED.

Names of Agents.	Duties.	Time of service.	Daily Pay.	Amount paid each.	Aggregate.
*J. Parry, Eli Williams, do.	Manager, Engineer, stat. engine, “	3 days 212 153	\$2 00 2 00 1 75	\$ 6 00 424 00 167 75	
Henry Shearer, Joseph McGee, Henry Harrison, do.	Firemen, “ Principal rigger, “	365 362 214 153	1 00 1 00 1 50 1 25	365 00 362 00 316 50 191 25	
*John Coryell, do.	Signal man, “	212 20	1 50 1 00	318 00 20 00	
Jesse B. Dull, do.	“ “	212 153	1 25 1 00	265 00 153 00	
William Thomas, Frederick Miley, William Childs, *John Daley, George Lambert, *Mathew Kerr,	Attacher, “ “ Watchman, “ “	365 162 364 216 146	1 00 1 00 1 00 1 00 1 00	365 00 162 00 364 00 216 00 146 00	
*Osborne and Scholfield, William Conover.	Horse power, hauling cars to & from Schuylkill plane, “ at foot of plane,	74mi's. 2732 04 1423 00		18 50 2732 04 1423 00	\$8,526 87½
COLUMBIA PLANE. Henry Cassel, do.	Manager. “	151 214	1 50 2 00	226 50 428 00	

	Engineer, stat. engine, "	30 days	\$2 00	\$ 60 00
*Thomas Barber,		182	2 00	364 00
Abraham Varley,	"	153	1 75	267 75
do.		151	1 25	188 75
*Isaac Mason,	Fireman,	173	1 00	173 00
do.	"	9	1 00	9 00
George Heagy,		91	1 50	136 50
John Jenks,	Principal rigger,	273	1 25	341 25
do.	"	61	1 25	76 25
*Thomas B. Odell,	Signal man,	304	1 00	204 00
do.	"	61	1 25	76 25
Jesse M. Kneir,	"	304	1 00	304 00
do.	"	61	1 25	76 25
Joseph Bowman,	Attacher,	304	1 00	304 00
do.	"	61	1 25	67 24
Edward A. Martin,	"	193	1 00	173 00
co.	"	111	1 00	111 00
*Hugh L. Pedan,	"	120	1 00	120 00
*William Wilson,	Watchman,	61	1 00	61 00
*John Wilson,	"			4,047 02
Mullison & Collins,	Horse power, hauling cars to and from Columbia plane,			
\$7,943 77				
SUPERINTENDENTS, CLERKS, PASSENGER AGENTS, &c.				
Andrew Mehaffey,	Super'nt. motive power,	365	4 00	1,460 00
William Russell,	Clerk in super'nt. office,	160	1 00	160 00
Thomas Dickey,	"	205	2 00	410 00
W. P. Beatty, jr.	Manager Schuy'l. level,	365	2 50	912 50
*George Rakestraw,	Car inspector,	151	2 50	377 50

D.—CONTINUED.

Names of Agents.	Duties.	Time of service.	Daily Pay.	Amount paid each.	Aggregate.
Frederick Dern,	Car inspector,	104	2 00	208 00	\$5,726 87½
Hugh L. Pedan,	State agent, pass'r. cars,	254	2 00	508 00	
Solon Fleming,	"	253	2 00	506 00	
Abraham Yousling,	"	214	2 00	428 00	
John A. Kauffelt,	"	214	2 00	428 00	
John Buchanan,	Conductor state cars,	59	1 12½	66 37½	
do.	"	210	1 25	262 50	
ENGINEERS OF LOCOMOTIVES.					
Kirk Few,	Engineer,	195	2 25	438 75	
do.	"	9	2 00	18 00	
do.	"	153	1 75	267 75	
John Mellinger,	"	206	2 25	463 50	
do.	"	6	2 00	12 00	
do.	"	153	1 75	267 75	
*Charles Lay,	"	214	2 25	481 50	
do.	"	3	2 00	6 00	
*Henry Dehuff,	"	58	2 25	130 50	
do.	"	10	2 00	20 00	
*Charles Whiting,	"	16	2 25	36 00	
do.	"	13	2 00	26 00	
*John Trissler,	"	145	2 25	326 25	
*George Murray,	"	33	2 25	74 25	

*George Murray,	Engineer,	9	2 00	18 00
*Henry H. Bush,	"	36	2 25	81 00
do.	"	6	2 00	12 00
*Jacob Wilson,	"	145	2 25	326 25
do.	"	22	2 00	44 00
Beale Few,	"	126	2 25	283 50
do.	"	153	1 75	267 75
Elisha Hamil,	"	199 $\frac{1}{2}$	2 25	448 87 $\frac{1}{2}$
do.	"	153	1 75	267 75
*Solon Fleming,	"	28	2 25	63 00
*Jacob Downing,	"	129	2 25	290 25
do.	"	28	2 00	56 00
Daniel Hall,	"	21 $\frac{1}{2}$	2 25	48 37 $\frac{1}{2}$
do.	"	113	1 75	197 75
*Samuel S. Parke,	"	13	2 25	29 25
do.	"	30	2 00	60 00
*John Donahue,	"	182	2 25	409 50
do.	"	30	2 00	60 00
do.	"	83	1 75	145 25
*Frederick Lunger,	"	143	2 25	321 75
do.	"	10	2 00	20 00
do.	"	153	1 75	267 75
*H. Montgomery,	"	2	2 25	4 50
Patrick Donahue,	"	77	2 25	173 25
do.	"	147	1 75	257 25
*David Belvan,	"	44	2 25	99 00
Fabius Fleming,	"	71	2 25	159 75
do.	"	153	1 75	267 75

D.—CONTINUED.

Names of Agents.	Duties.	Time of service.	Daily Pay.	Amount paid each	Aggregate.	
*James McKinley,	Engineer,	30 days	2 25	67 50	\$8,612 12½	
*Patrick Smith,	"	8	2 25	18 00		
*Isaac Reifsnnyder,	"	36	2 25	81 00		
John Pelan,	"	58	2 25	130 50		
do.	"	89	1 75	155 75		
*A. Patterson,	"	74	2 25	166 50		
do.	"	48	1 75	84 00		
*Geo. W. Brown,	"	39	2 25	87 75		
do.	"	124	1 75	217 00		
Jenkins Few,	"	4	2 25	9 00		
*Thomas Rome,	"	10	2 00	20 00		
*Leonard Phlegan,	"	6	2 00	12 00		
*Thomas Sirlee,	"	4	2 00	8 00		
*Thomas Barlow,	"	8	2 00	16 00		
Hugh Maloney,	"	71	1 75	124 25		
David Currie,	"	70	1 75	122 50		
Isaac Dunn,	"	22	1 75	38 50		
Henry Holl.	"	3½	1 75	6 12½		
FIREMEN OF LOCO-						
MOTIVES.						
Jenkins Few,	Fireman,	187	1 25	233 75		
do.	"	160	1 00	160 00		

*Geo. W. Brown,	153	1 25	191 25
do.	6	1 00	6 00
Joshua Martin,	209	1 25	261 25
do.	139	1 00	139 00
*David Bendley,	50	1 25	62 50
do.	10	1 00	10 00
*George Carear,	18	1 25	22 50
do.	13	1 00	13 00
*John Trissler,	20	1 25	25 00
Hugh Maloney,	192½	1 25	240 62½
do.	82	1 00	82 00
*I. G. Friesbach,	3	1 00	3 00
Henry Holl,	35	1 25	43 75
do.	66½	1 00	66 50
*John Pelan,	81	1 25	101 25
do.	6	1 00	6 00
*Joseph Brinton,	38	1 25	47 50
do.	22	1 00	22 00
*Evans Brinton,	46	1 25	57 50
do.	10	1 00	10 00
*Isaac Dunn,	209½	1 25	261 87½
do.	131½	1 00	131 50
*James McKinley,	30	1 25	37 50
*Daniel Holl,	28	1 25	35 00
do.	4	1 00	4 00
*Archibald Gribble,	143	1 25	178 75
do.	75	1 00	75 00
*Samuel Stanford,	133	1 25	166 25

D.—CONTINUED.

Names of Agents.	Duties.	Time of service	Daily Pay.	Amount paid each.	Aggregate.
*Samuel Stanford,	Firemen,	22 days	\$1 00	\$22 00	
*Stephen D. Jones,	"	84	1 25	105 00	
do.	"	30	1 00	30 00	
*Patrick Donahue,	"	105	1 25	131 25	
do.	"	30	1 00	30 00	
Rudolph Graff,	"	147½	1 25	184 37½	
do.	"	153	1 00	153 00	
*Isaac Norcross,	"	17	1 25	21 25	
*John Hance,	"	3	1 25	3 75	
Michael Kelly,	"	78	1 25	97 50	
do.	"	153	1 00	153 00	
James Cann,	"	94	1 25	117 50	
do.	"	153	1 00	153 00	
*B. McCanna,	"	31	1 25	38 75	
do.	"	30	1 00	30 00	
*Samuel Rupley,	"	24	1 25	30 00	
*Richard Barrick,	"	37	1 25	46 25	
do.	"	3	1 00	3 00	
Henry E. Heble,	"	10	1 25	12 50	
do.	"	80	1 00	80 00	
*Edward Lanel,	"	2	1 25	2 50	
*John Kauffman,	"	20	1 25	25 00	
Allen Smith,	"	58	1 25	72 50	

D.—CONTINUED.

Names of Agents.	Dutie.	No. of Cords.	Pay per cord.	Amount paid each.	Aggregate.
WOODMEN.					
George Smith,	Woodman,	179 $\frac{1}{2}$	\$1 00	\$179 50	
do.	"	131	75	98 25	
George Geiger,	"	79 $\frac{1}{2}$	1 00	79 50	
do.	"	131	75	98 25	
Jacob Oaks,	"	181 $\frac{1}{2}$	1 00	181 50	
do.	"	131	75	98 25	
Jacob Wagner,	"	180	1 00	180 00	
do.	"	131	75	98 25	
Peter May,	"	79	1 00	79 00	
do.	"	131	75	98 25	
Henry Dietz,	"	181	1 00	181 00	
do.	"	131	75	98 25	
*Michael Leiffley,	"	181 $\frac{1}{2}$	1 00	181 50	
*C. Yeager,	"	53	1 00	53 00	
*George Miller,	"	51 $\frac{1}{2}$ $\frac{3}{4}$	1 00	51 50	
Jos. M. Woodward,	"	218 $\frac{3}{4}$	1 00	218 75	
*William Bittle,	"	32	1 00	32 00	
*Nathaniel Rue,	"	174 $\frac{1}{2}$	1 00	174 00	
do.	"	70 $\frac{1}{2}$	75	52 67 $\frac{1}{2}$	
William Sweeten,	"	178	1 00	178 00	
do.	"	125 $\frac{1}{2}$	75	94 12 $\frac{1}{2}$	
Edward Snyder,	"	184 $\frac{3}{4}$	1 00	184 12 $\frac{1}{2}$	

Edward Snyder,	"	106	75	79 50
Thomas Griffith,	"	180 $\frac{1}{2}$	1 00	180 50
do.	"	106 $\frac{1}{2}$	75	79 87 $\frac{1}{2}$
Daniel Meredith,	"	169	1 00	169 00
do.	"	41	75	30 75
*James Milton,	"	60	1 00	60 00
*Elijah Loudon,	"	126	1 00	126 00
*Geo. Nunweiler,	"	21 $\frac{3}{4}$	1 00	21 75
*Jacob Senatz,	"	4	1 00	4 00
*Jacob Lutz,	"	2 $\frac{1}{2}$	1 00	2 50
Timothy Crowley,	"	180	1 00	180 00
do.	"	127 $\frac{1}{2}$	75	95 62 $\frac{1}{2}$
Fred'k Senatz,	"	166 $\frac{1}{2}$	1 00	166 50
do.	"	122 $\frac{1}{2}$	75	91 87 $\frac{1}{2}$
*Samuel White,	"	74 $\frac{1}{2}$	1 00	74 50
Joseph Potter,	"	181	1 00	181 00
do.	"	61 $\frac{1}{2}$	75	45 93 $\frac{3}{4}$
John B Irestu,	"	77	1 00	77 00
*N. Knight,	"	24 $\frac{1}{2}$	1 00	24 50
*Jos. Cunningham,	"	26	1 00	26 00
*Thos. H. Patterson,	"	103 $\frac{1}{2}$	1 00	103 50
do.	"	51	75	38 25
*Leopold Winter,	"	38	1 00	38 00
*Frederick Fulmer,	"	27	1 00	27 00
Joseph Engleman,	"	79	1 00	79 00
do.	"	131	75	98 25
*Ludwick Young,	"	16	1 00	16 00
*Fred'k Houck,	"	47 $\frac{1}{2}$	1 00	47 50

D.—CONTINUED.

Names of Agents.	Duties.	No. of Cords.	Pay per Cord.	Amount paid each.	Aggregate.
Wm. McCruden,	Woodman,	74 ³ / ₄	1 00	\$ 7 75	
do.	"	79	75	59 25	
*Andrew Forbes,	"	78	1 00	78 00	
John Walter,	"	56 ¹ / ₂	1 00	56 50	
do.	"	18 ¹ / ₂	75	13 87 ¹ / ₂	
†George Markle,	"	32 ¹ / ₂	1 00	32 50	
*Timothy Donevan,	"	32 ¹ / ₂	1 00	32 50	
Conrad Collage,	"	42	1 00	42 00	
do.	"	24	75	18 00	
Reese & Leaman,	"	210 ³ / ₄	1 00	210 75	
do.	"	435	75	326 25	
do.	"	649 ³ / ₈	87 ¹ / ₂	568 42	
Samuel Dennis,	"	cord-1084 ³ / ₈ ling,	12 ¹ / ₂	135 57 ¹ / ₂	
*Mallon Robinson,	"	90 ³ / ₄	1 00	90 75	
Oliver P. Ross,	"	508 ¹ / ₂	1 00	508 12 ¹ / ₂	
do.	"	352 ³ / ₄	87 ¹ / ₂	308 65 ¹ / ₂	
James Scott,	"	36	1 00	36 00	
do.	"	93	75	69 75	
James Hutchinson,	"	88 ¹ / ₂	1 00	88 50	
Millin Elliott,	"	105	1 00	105 00	
*Tho's Armstrong,	"	112 ³ / ₄	75	84 56	
Eli McCann,	"	47 ¹ / ₂	75	35 62 ¹ / ₂	
*Patrick McCue,	"	18 ¹ / ₂	75	13 87 ¹ / ₂	
					\$7,848 02

Names of Agents.	Duties.	Time of service.	Daily Pay.	Amount paid each	Aggregate.
WATERMEN.					
Martin Smith,	Waterman, " " " " " " " " " " " " " " " " " " " " " " " " " " " "	151 days	1 00	\$151 00	
Gerhard Brand,		211 $\frac{1}{2}$	1 00	211 50	
do.		153	75	114 75	
*John Rote,		212	1 00	212 00	
do.		129	75	96 75	
*John King,		120	1 00	120 00	
*James B. Lytle,		120	1 00	120 00	
*Nathaniel Trout,		151	1 00	151 00	
Samuel Bricker,		212	1 00	212 00	
do.		153	75	114 75	
Peter Donnelly,		212	1 00	212 00	
do.		153	75	114 75	
*Samuel White,		25 $\frac{1}{2}$	1 00	25 50	
John Hutchinson,		212	1 00	212 00	
do.		153	75	114 75	
Hugh Campbell,		209 $\frac{1}{2}$	1 00	209 50	
*Thos. Armstrong,		212	1 00	212 00	
John B. Irestu,		122	1 00	122 00	
do.		153	75	114 75	
*Mablon Robinson,		30	1 00	30 00	
Jacob Ricksten,		212	1 00	212 00	
do.		153	75	114 75	

D—CONTINUED.

Names of Agents.	Duties.	Time of service.	Daily Pay.	Amount paid each.	Aggregate.
*James Pyott,	Waterman,	212 days	\$1 00	\$212 00	
do.	"	61	75	45 75	
*Wm. Thompson,	"	151	1 00	151 00	
Joseph Irvine,	"	211	1 00	211 00	
do.	"	150	75	112 50	
*R. Cunningham,	"	182	1 00	182 00	
do.	"	21	75	15 75	
Major Whitesides,	"	212	1 00	212 00	
do.	"	153	75	114 75	
*Isaac Smith,	"	60	1 00	60 00	
Thomas Ross,	"	212	1 00	212 00	
do.	"	92	75	69 00	
*Abraham Freed,	"	92	1 00	92 00	
do.	"	61	75	45 75	
Andrew Trout,	"	92	1 00	92 00	
do.	"	153	75	114 75	
Conrad Smith,	"	61	1 00	61 00	
do.	"	5	75	3 75	
Paul Trout,	"	61	1 00	61 00	
do.	"	153	75	114 75	
Frederick Fulmer,	"	61	1 00	61 00	
do.	"	153	75	114 75	
*Martin Beck,	"	7	1 00	7 00	

ABSTRACT STATEMENT.

Expended at Parkersburg shop,	\$11,193 07½
" " Schuylkill do.	1,845 32
" " Columbia do.	1,026 85
" " Schuylkill plane,	8,977 54
" " Columbia do.	7,943 77
" for Superintendent, clerks, car inspectors, &c.,	5,726 87½
" " Engineers of locomotives,	8,612 12½
" " Firemen of do.	5,520 37½
" " Woodmen,	7,848 02
" " Watermen,	5,871 75
" " Wood,	19,793 35
" " Coal,	10,089 70½
" " Water for engines,	5,124 85½
" " Oil for do.	3,080 70
" " Miscellaneous,	405 45½
	<u>\$103,959 70½</u>

Exhibiting the number of Locomotive Engines placed upon the Columbia and Philadelphia Rail Way, prior to the 1st November, 1836. The time when they commenced running, the name of each Engine, from whom purchased.—Also showing the number of miles travelled, number of cars hauled, number of trips made, and the average number of Cars per trip by each, from November 1, 1836, to October 31, 1837.

COMMENCED RUNNING.	NAMES.	FROM WHOM PURCHASED.	NO. MILES TRAVELLED.	NO. OF CARS HAULED.	NO. OF TRIPS MADE.	AVERAGE PER TRIP.	REMARKS.
May 18, 1835.	Schuylkill,	M. W. Baldwin,	6,160	762	80	9½	Excellent repair.
" "	Delaware,	do.	10,349	1,320	137	9 2-3	In ordinary.
" "	Susquehanna,	do.	6,391	845	83	10 1-5	do.
" "	Ohio,	do.	8,485	1,147	105	11	do.
" "	Columbia,	do.	4,389	517	57	9	do.
" "	Pennsylvania,	do.	7,931	987	103	9½	Excellent repair.
" "	Philadelphia,	do.	7,777	999	101	11	In ordinary.
" "	Lancaster,	do.	11,319	1,500	147	10 1-5	do.
July 23, "	Kentucky,	do.	7,084	1,102	92	12	do.
September 7, "	Juniata,	do.	17,479	2,156	227	9½	do.
October 22, "	Brandywine,	do.	10,395	1,457	135	11	Excellent repair.
October 14, "	William Penn,	Long & Norris,					In ordinary.
July 13, 1836.	George Washington,	William Norris,					Sent to Portage road,
May 12, "	Robert Morris,	do.	154	21	2	10½	do.
August 19, "	Benjamin Franklin,	do.	2,772	294	36	8 1-6	do.
October 18, "	W. C. Farmer,	do.	3,157	380	41	9½	Excellent repair.
September 1, "	America,	C. Sellars & Son,					Useless.
September 1, "	Sampson,	do.	7,425	1,084	95	11½	In ordinary.
July 7, 1835.	Albion,	A. & G. Ralston,					Useless.
June 18, "	Atlantic,	do.					do.
May 18, "	John Bull,	do.					do.
July 24, "	Fire Fly,	do.					Sold.
July 27, "	Red Rover,	do.					do.
May 28, 1836.	Planet,	Young,	398	33	4	8	In ordinary.
July 22, "	Columbus,	do.					do.
July 16, "	Comet,	do.					Excellent repair.

Exhibiting the number of Locomotive Engines placed upon the Columbia and Philadelphia Rail way, subsequent to the 1st November, 1836. The time when they commenced running, the name of each engine, from whom purchased, the cost of each,—Also showing the number of miles travelled, number of cars hauled, number of trips made, and the average number of cars per trip by each, from November 1st 1836, to October 31st 1837.

COMMENCED RUNNING.	NAMES.	FROM WHOM PURCHASED.	COST OF EACH.	NO. MILES TRAVELED.	NO. OF CARS HAULED.	NO. TRIPS MADE.	AVERAGE PER TRIP.	REMARKS.
February, 22, 1837,	Conestoga,	M. W. Baldwin,	7,500 00	2,695	774	35	22 $\frac{1}{2}$	Sent to Portage road.
March 24, "	Ed. F. Gay,	do.	7,500 00	10,549	2,857	137	20	Excellent repair.
April 2, "	Parksburg,	do.	7,500 00	10,626	2,906	138	21	do.
" 7, "	Octorara,	do.	7,500 00	2,464	632	32	20	In ordinary.
" 16, "	Downingtown,	do.	7,500 00	11,242	2,918	146	20	Excellent repairs.
" 24, "	Pequea,	do.	7,500 00	1,848	472	24	20	do.
May 1, "	Indiana,	do.	7,500 00	10,164	2,815	132	21 $\frac{1}{2}$	do.
" 0, "	Mississippi,	do.	7,500 00	4,081	1,060	53	20	do.
" 15, "	Montgomery,	do.	7,500 00	5,082	1,177	66	18	do.
" 28, "	Wisconsin,	do.	7,500 00	308	73	4	18	Sent to Clark's Ferry.
January 19, "	Westchester,	do.	7,000 00	12,936	1,665	168	10	Excellent repair.
February 22, "	Virginia,	do.	7,000 00	16,632	1,920	216	88-9	do.
" " "	Paoli,	do.	7,000 00	16,170	1,872	210	9	do.
March, 3, "	Bald Eagle,	Garrett & Eastwick,	7,000 00	1,463	271	19	14 $\frac{1}{2}$	do.
April 16, "	Telegraph,	do.	7,000 00	3,696	550	48	11 $\frac{1}{2}$	do.
May 23, "	Enterprise,	do.	7,000 00	1,155	213	15	14 1-5	do.
March 21, "	Lafayette,	William Norris,	6,500 00	1,550	360	20	18	do.
" " "	Jas. Madison,	do.	6,950 00	1,232	198	16	12 $\frac{1}{2}$	do.
April 17, "	Bush Hill,	do.	7,500 00	616	135	8	17	Sent to Portage road.
May 22, "	United States,	do.	7,500 00	693	171	9	19	Excellent repair.
June 12, "	Constitution,	do.	7,500 00	231	82	3	27	do.
July 4, "	Independence,	do.	7,500 00	154	34	2	17	do.
December 6, "	Pittsburger,	M'Clurg W. C.	6,250 00	1,078	108	14	75-7	Sent to Portage road.
November " "	Backwoodsman.	do.	6,250 00	1,309	197	17	11 2-3	do.

RECAPITULATION.

Excellent repair 23.

In ordinary 13.

Useless 4.

Sold 2.

Sent to Portage 7.

To Clark's Ferry 1.

Total number 50.

D—CONTINUED.

* 1 2 3 4 5 6 7 8 9 10 11 12

*James Love,					
Michael Leiffley,					
Conrad Collage,					
*Wm. McCruden,					
*Evan Smith,					
Mahlon Robinson,					
	7	1 00	7 00		
	152	75	114 00		
	120	75	90 00		
	38	75	28 50		
	31	75	23 25		
	61	75	45 75		
					\$5.871_75

G.

The following exhibits the whole cost of repairs of engines, including materials, pay of hands, superintendent of machinery, fuel, and all other expenses consequent thereto, from Nov. 1, 1836, to Oct. 31, 1837.

For superintendent of machinery,		\$1,460 00
“ Hands at Parkesburg shop,		9,733 07½
“ Materials for engines,		5,124 85½
“ 90 gallons sperm oil,	at \$1 00	90 00
“ 104 tons anthracite coal,	4 50	468 00
“ 500 bush ls bituminous do.,	25	125 00
“ Annual interest on State engine, tools and machinery, and machine shop,		785 00
“ Annual loss of wear and tear of tools and machinery,		250 00
		<u>\$18,035 93</u>

H.

An account current, showing the cost of the repairs of the locomotive engines during the year, at Job prices :

Locomotive,	Delaware,	\$811 00
“	Sampson,	157 00
“	Susquehanna,	222 75
“	Ohio,	544 52
“	Kentucky,	1,301 00
“	Schuylkill,	2,095 35
“	Philadelphia,	1,062 30
“	Pennsylvania,	2,607 80
“	Robert Morris,	1,145 50
“	W. C. Farmer,	33 00
“	George Washington,	948 97½
“	Columbia,	452 40
“	Juniata,	1,398 60
“	Brandywine,	882 90
“	Westchester,	1,060 93
“	Lancaster,	1,242 45
“	Wisconsin,	126 50
“	Downingtown,	190 27½
“	Edward F. Gay,	181 75
“	Parkesburg,	168 15
“	Montgomery,	59 00
“	Indiana,	347 30
“	Mississippi,	133 00
“	Paoli,	95 53
“	Virginia,	238 58
“	Pequea,	513 00
“	Conestoga,	127 50

Work done to other machinery on hand, and not included in the above charges,

3,560 00

Also, for making snow ploughs and amount paid to shop hands, clearing off snow on eastern division, of road, and work done, and materials furnished for engines on Portage rail road,

3,582 00

\$25,289 06

J.

Abstract of Passenger Returns, 1837

Months.	Pioneer and Pennsylvania Packet Boat Lines.		Peoples' Line.		Express Leech's, and Leech's fast lines.	
	Agent.		Agent.		Agent.	
	Company.		Company.		Company.	
March,	1,838 94	1,720 64	1,596 94	1,508 96	66 30	62 16
April,	2,485 46	2,409 92	1,511 78	1,329 04	1,328 50	1,302 16
May,	2,067 63	1,924 46	1,242 16	1,183 14	1,318 45	1,246 10
June,	1,879 26	1,720 08	1,027 18	863 88	1,245 98	1,242 10
July,	2,679 65	2,560 96	1,532 80	1,382 90	51 40	35 26
August,	2,886 56	2,746 70	1,567 74	1,691 54	30 10	54 94
September,	2,867 72	2,642 04	1,382 04	1,322 12	22 16	51 66
October,*						
	\$16,705.22	15,724 80	9,860 64	9,281 58	4,062 89	3,994 38

* Returns not complete.

RECAPITULATION.

PIONEER AND PACKET BOAT LINES.

Agent,	\$16,705 22	
Company,	15,724 80	
	<hr/>	
Difference,		\$980 42

PEOPLES' LINE.

Agent,	\$9,860 64	
Company,	9,281 58	
	<hr/>	
Difference,		579 06

LEECH'S LINES.

Agent,	\$4,062 89	
Company,	3,994 38	
	<hr/>	
Difference,		68 51
		<hr/>
Total difference,		<u>\$1,627 99</u>

COLLECTOR'S OFFICE, Philadelphia, }
November 4, 1837. }

K.

Annual Expense of maintaining Schuylkill Plane as follows:

One rope,		\$2,839 50
Services of engineer of stationary engine,		750 00
“ “ 2 firemen, do.		730 00
“ “ 4 signal men,		1,460 00
“ “ 1 watchman,		365 00
“ “ 1 rigger,		456 25
“ “ attaching ropes,		160 50
730 tons coal,	at \$5 50	4,015 00
2 horses and 1 man at foot of plane,		1,825 00
Manager at head of plane,		912 50
		<hr/>
		<u>\$13,493 75</u>

*Annual expenses from the foot of the above named Plane
to Broad street as follows :*

Fuel for engines,	\$5,475 00	
Oil " do.	730 00	
2 engineers,	1,460 00	
2 firemen,	912 50	
1 manager of transportation,	912 50	
	<hr/>	\$9,490 00
Whole annual cost of plane,		<hr/> <hr/> \$22,983 75

L.

*Showing the number of passengers transported on the Columbia
and Philadelphia rail road, and the amount of the rail road and
motive power toll received at the offices during the year.*

Number of passengers, 104,793

	RAIL ROAD TOLL.	MOTIVE POWER TOLL.
Columbia,	\$72,014 91	\$60,348 91
Lancaster,	12,297 57	8,210 26
Downingtown,	9,304 50	6,645 40
Paoli,	3,914 05	932 09
Philadelphia,	112,906 18	61,202 01
Schuylkill viaduct,	886 95	
	<hr/>	<hr/>
	\$211,324 16	\$137,338 67
	<hr/> <hr/>	<hr/> <hr/>

M.

Estimated amount required for the ensuing year :

For House and lot at Parkesburg,	\$2,500 00
" Tools, machinery, &c.	5,000 00
" Additional set of ropes at planes,	4,000 00
" Balance on 2 locomotive tenders,	559 77
	<hr/>
	\$12,059 77
	<hr/> <hr/>

No. 4.—H. R. 13.

**Report of William Russel, Superintendent of repairs,
with accompanying statements.***To the Hon. the Board of Canal Commissioners :*

GENTLEMEN—In making this report, as supervisor of repairs on the Columbia and Philadelphia rail way, I would remind the board that I had charge of the whole road only during a portion of the year. I was appointed to succeed Mr. Vogel, on the eastern division, on the 12th of March last, before which time, this report will relate only to the western division. During the year the expense for repairs has been of two kinds, viz.—Ordinary and Extraordinary. The former amounting to \$36,283 91 $\frac{3}{4}$, and the latter to \$13,435 75 $\frac{1}{4}$, making a total of \$49,719 66. It will be remarked, however, that this only includes the repairs of the whole road back to the 13th of March, and does not embrace the expenditure on the eastern division previous to that day, for the reason above given. The above total will not agree with the State Treasurer's accounts, because in it are included \$2,169 02 yet unpaid, for work performed in the month of October, for which no money has been drawn, but which is included in order to show the whole expense of repairs on the portion of the road which was under my charge during the year. On reference to the proper department, it appears that up to 13th March, Mr. Vogel paid out for repairs \$9,305 29, making the whole expense of repairs for the year on the whole road \$59,024 95. Under the head of ordinary repairs are embraced raising and adjusting blocks and cross ties, driving wedges, clearing out side drains, and renewing the wooden track on the eastern twenty-two miles of the north track. This last item with the pay of foreman which is charged to the ordinary repairs of the road, the whole year round, though frequently engaged in making extraordinary repairs, form the heaviest portion of the expense of ordinary repairs; on the subject of ordinary repairs, no other remark is necessary except that during the ensuing year, the expense will be considerably less than during the one just closed, if the ordinary repair fund be relieved of the large and increasing cost of keeping the eastern twenty-two miles of the north track in order. The necessity of which will hereafter be more fully explained. The rest of the road is now in an excellent state, and I have no hesitation in saying that no interruption of business or heavy expenditure will occur during the season, unless something now unforeseen occur. Table A., will show the names of the different foremen of repairs, with the amount paid to each, and the amount of their check rolls, which are in the Auditor General's office, for each month in the year,

and will present a view of the ordinary repair operations as nearly as they can be separated, exclusive of mechanics' bills, which are also on file in the Auditor General's office. Under the head of extraordinary repairs are embraced,

1.—STRENGTHENING RAIL WAY BRIDGES.

At the time of making the last report, buttress walls had been commenced round three of the piers of Little Conestoga bridge, and the expense then incurred was \$2,684 75; they have since been completed at a further expense of \$1,926 50, making a total of \$4,611 25. It will be recollected that the whole cost, as estimated in the last report, was \$5,000. The cost of similar work done to the Mill Creek bridge at the time of the last report, was \$1,100, which has since been completed at a further cost of \$5,303 50, making a total of \$6,403 50. For further explanation of the nature and necessity of the expenditure on these two bridges, the board are referred to the report of last year. Though in the last report it was said that the Big Conestoga and other bridges would not require any extraordinary repairs during the year, yet such did not turn out to be the case, when the new and heavy locomotives now in use were put on the road, it was found that most of the bridges were insufficient to bear the increased weight without risk. After consultation with the chief engineer of the line, it was concluded to strengthen the superstructure of the whole of them (except that at Coatesville, which differs in construction from the rest,) by inserting additional girders or bearing pieces, at an aggregate cost of \$4,659 61. This sum has all been paid except \$1,228 72 for iron and smith work furnished to Big Conestoga bridge, which has not yet been called for. It is believed that the bridges which have thus been repaired and strengthened, are now sound and strong enough to bear any weight that will be placed on them. Table B., will show the cost of extraordinary repairs made during the year.

2.—PUTTING IN FRAMES TO PREVENT THE QUICK SAND FROM COVERING THE RAILS AT THE GAP.

Heretofore the removal of the sand which was continually slipping upon the rails in the deep cut at this point, was a most troublesome and expensive item of repairs. To obviate the difficulty and to secure it against such an interruption of the use of the road as was produced by this cause last year, it was thought better this season to put in wooden frames on each side of the road, boarded with stone and secured to the rails so as to prevent the slipping in and rising of the sand. This arrangement is now completed, and, it is believed, will hereafter be effectual. The cost of the frames did not exceed five hundred dollars. Though it cannot now be accurately ascertained, as the same hands who made it, were employed at intervals during its progress in making the ordinary repairs of the section.—The whole of the rail on the gap grade is wood, with iron bars;

many of the wooden rails and cross ties are now decayed, and will require to be renewed next season.

3.—THE DEEP CUT BELOW PARKESBURG,

Has continued, as usual, to be very expensive. In the months of March, April, May, June and July, \$1046 14 were expended in removing the quick sand, or marl slips from this portion of the road. During the rest of the season it remained in good order, but will, beyond a doubt, be subject to the same occurrence next spring. It is most earnestly suggested to the board that walls should be erected on each side of the road through this cut, which would entirely remedy this evil. It is believed that \$2,000, or \$2,500 would cover the whole cost, and would save the expenditure of half that sum annually for many years. The true interest of the State requires the necessary appropriation.

4.—SNOW DRIFTS.

An instance of this kind occurred in January last; on the 22d, 23d and 24th of that month, the whole road was entirely obstructed. In many of the cuts the snow was from six to eight feet deep, and near three feet on the whole road. It was worked at night and day, till midnight on Tuesday the 24th, when the parties from each end met. The whole of the south track was then clear, and so remained during the winter. The other track was also opened in a few days. The whole cost of opening the road on the western division was six hundred and seventy-three dollars and forty-seven and a quarter cents, which has not yet been regularly settled. At that time the repair fund was exhausted, but still it would not do to permit the road to remain blocked up, and as men could not be had to work on credit on such an occasion, it became necessary to apply the proceeds of a sale of old broken rail chains, which had been made a short time before to this urgent object. This amount nearly covered the expenses, and will be settled for in the usual manner, when there shall be repair funds in my hands to reimburse the same. Table C. will exhibit a general view of the various funds and appropriations which have been in my hands during the year, and the balances yet unexpended, viz: for repairs, damages, mechanical implements at Parkesburg, enlargement of shop at Parkesburg, ropes, retained percentage, fund to pay engineers and superintendents, construction, motive power, and new work on old lines, the whole balance in my hands being \$8,778 69. Some of these subjects require explanation.

DAMAGES.

The balance on hand is \$1,285. The principal payment was for the burning of Mr. Ely's barn, \$2,600; the others were made for smaller claims, for injury sustained by the construction of the road, and never called for before. The repayment of \$6,408, as per account

into the State treasury, took place when the resolution under which I acted as superintendent was for a short time rescinded.

MECHANICAL IMPLEMENTS.

The balance on hand will soon be required to pay for implements contracted for some time since for shop at Parkesburg.

ENLARGEMENT OF PARKESBURG SHOP.

The first estimate has been paid on the work, but the final estimate will be made in a few days, when the whole fund will be paid out except a small balance which will be required to finish off the work.

ROPES.

A part of the balance on hand will be required for attaching ropes, and the remainder will be added to the appropriation which will be made for next season.

RETAINED PERCENTAGE.

This account is now closed so far as the funds in hand extend, nor is it known that any other demands exist.

ENGINEERS, SUPERINTENDENTS, &c.

The balance on hand for this purpose, was refunded to the Treasury at the same time with the damage fund.

CONSTRUCTION.

This account is also closed, the balance having been returned to the State Treasury.

MOTIVE POWER.

With regard to the payments for motive power expenses, within the year, it is necessary to remark, that though the superintendent of motive power became a disbursing officer, on the first day of the year, yet it was thought proper that I should settle up the old debts of that kind, which had been contracted while I had the disbursement of that fund, but all debts contracted since have been discharged by the proper superintendent.

NEW WORK ON OLD LINES.

The principal expenditure under this head, was for additional work to the stationary engines at Columbia, and Schuylkill inclined planes, amounting to about \$2,300. From this fund was also paid the expense of building a collector's office, and removing the old, and constructing new weigh scales at Philadelphia. The first of which cost seven hundred dollars, and the two latter one thousand dollars.

The rest of the expenditure was for small items, on different parts of the line. The change of the collector's office, and weigh scales, has proved most advantageous. Besides, bringing those important points into the business part of the city, the placing of weigh scales on each track, has already nearly defrayed the expense of the change. Formerly, there was no means of weighing cars going to the city, and put on the road east of Lancaster. The weight of the load was left to the return of the agent, because there were no scales on that track at the city.

Having thus explained the transactions of the year past, it is proper to present some remarks as to the present condition of the road, and the repairs and improvements that will be necessary during the ensuing season. The eastern twenty-two miles of the north track, are in a wretched condition, and have been a cause of great expense heretofore. If not now put in good order, they will not only be unceasingly expensive, but will be exceedingly difficult to retain in safe repair. The true policy, (if a portion of this part of the road be not abandoned by the avoidance of the Schuylkill plane,) is to put the whole in thorough and substantial repair. The annual sum which in its present condition, will be required to keep it in order, will be far more than the interest of the sum necessary to place it in permanent repair. The chief engineer of the line, has reported on this subject, and has also submitted a plan and estimate for the work, which I most earnestly hope, may be authorised by the Legislature. The same officer, has also brought the subject of Maul's bridge to the attention of the board. In his suggestion, I fully concur. His plan is to substitute an embankment, instead of the present shackling structure. The bridge which is now supported by wooden props, cannot, without great expense be kept standing through the next season. The sills, and the original supports being generally rotten. The expense of an embankment, according to an estimate made by said officer is \$6,500. The whole appropriations asked for in this report, exclusive of that for renewing the twenty-two miles of the north track, are,

Side walls at Parkesburg cut	\$2,000
Embankment at Maul's bridge,	6,500
All which is respectfully submitted.	

W. RUSSELL,

Supervisor on Columbia and Philadelphia Rail road.

RAIL ROAD OFFICE, Lancaster, }
November 1, 1837. }

A.

The following exhibits the names of all the foremen of repairs, together with their daily pay, the number of days employed, and the whole amount paid to each; also the amount of the check roll of each, for every month between the 1st November, 1836, and 31st October, 1837. The check rolls are in the Auditor General's office.

NAMES.	Daily pay.	No. of days.	Amount paid each.	Amount of check roll.
NOVEMBER.				
Alexander Rowan,	\$1 50	30	\$45 00	\$176 31 $\frac{1}{4}$
George Mullen,	1 50	30	45 00	196 59
Frederick Dern,	1 50	30	45 00	254 79 $\frac{3}{4}$
James Blair,	1 50	30	45 00	158 00 $\frac{1}{4}$
George Wike,	1 50	30	45 00	198 40
James Divine,	1 50	30	45 00	208 21 $\frac{1}{4}$
Jeremiah Whitsen,	1 50	30	45 00	333 50 $\frac{3}{4}$
DECEMBER.				
Alexander Rowan,	1 50	31	46 50	99 43 $\frac{3}{4}$
George Mullen,	1 50	31	46 50	85 44 $\frac{3}{8}$
Frederick Dern,	1 50	31	46 50	192 75 $\frac{1}{2}$
James Blair,	1 50	31	46 50	111 90 $\frac{1}{2}$
Henry Eckman,	1 50	31	46 50	87 87 $\frac{1}{2}$
James Divine,	1 50	31	46 50	196 69 $\frac{3}{8}$
Jeremiah Whitsen,	1 50	31	46 50	145 40

JANUARY.

Alexander Rowan,	1 50	31	46 50	90 25
George Mullen,	1 50	31	46 50	89 37 $\frac{1}{4}$
Frederick Dern,	1 50	31	46 50	117 81 $\frac{1}{4}$
James Blair,	1 50	31	46 50	102 93
Henry Eckman,	1 50	31	46 50	87 62 $\frac{1}{2}$
James Divine,	1 50	31	45 00	144 93 $\frac{3}{4}$
Jeremiah Whitson,	1 50	31	46 50	175 33 $\frac{1}{4}$

FEBRUARY.

Alexander Rowan,	1 50	28	42 00	77 00
George Mullen,	1 50	28	42 00	77 00
Frederick Dern,	1 50	28	42 00	118 19
James Blair,	1 50	28	42 00	99 96 $\frac{3}{4}$
Henry Eckman,	1 50	28	42 00	78 75
James Divine,	1 50	28	42 00	136 37 $\frac{1}{4}$
Jeremiah Whitson,	1 50	28	42 00	309 34 $\frac{1}{4}$
Jacob T. Minster,	1 50	28	42 00	183 06 $\frac{1}{4}$
Thomas Walker,	1 50	28	42 00	162 06 $\frac{1}{4}$
Philip Thomas	1 50	28	42 00	165 40 $\frac{1}{4}$
William Cline,	1 50	28	42 00	187 06 $\frac{1}{4}$
William Williams,	1 50	28	42 00	183 68
William Maurer,	1 50	28	42 00	150 11 $\frac{3}{4}$

MARCH.

Alexander Rowan,	1 50	31	46 50	159 68 $\frac{1}{2}$
George Mullen,	1 50	31	46 50	81 50
Frederick Dern,	1 50	31	45 50	187 50 $\frac{1}{4}$

A—CONTINUED.

NAMES.	Daily pay.	No. of days.	Amount paid each.	Amount of check roll.
James Blair,	1 50	31	46 50	\$126 52 $\frac{1}{2}$
Henry Eckman,	1 50	31	46 50	102 18 $\frac{3}{4}$
James Devine,	1 50	29	43 50	185 30 $\frac{1}{2}$
Jeremiah Whitson,	1 50	31	46 50	396 27 $\frac{1}{2}$
Jacob T. Minster.	1 50	31	46 50	204 56 $\frac{1}{4}$
Thomas Walker,	1 50	31	46 50	205 00
Philip Thomas,	1 50	31	46 50	180 68 $\frac{3}{4}$
William Cline,	1 50	31	46 50	253 25
William Williams,	1 50	31	46 50	246 61
William Maurer,	1 50	31	46 50	233 29
APRIL.				
Alexander Rowan,	1 50	30	45 00	177 37 $\frac{1}{2}$
George Mullen,	1 50	30	45 00	167 75
Frederick Derr,	1 50	30	45 00	207 75
James Blair,	1 50	30	45 00	196 50
Henry Eckman,	1 50	30	45 00	174 75
James Devine,	1 50	29	43 50	223 75
Jeremiah Whitson,	1 50	30	45 00	416 00
Jacob T. Minster,	1 50	30	45 00	193 00
Thomas Walker,	1 50	30	45 00	292 00
Philip Thomas,	1 50	30	45 00	250 25
William Cline,	1 50	30	15 00	270 12 $\frac{1}{2}$

William Williams,	1 50	30	45 00	317 12½
William Maurer,	1 50	30	45 00	272 15
<hr/>				
MAY.				
Alexander Rowan,	1 50	31	46 50	208 31½
George Mullen,	1 50	31	46 50	180 25
Frederick Dern,	1 50	31	46 50	217 25
James Blair,	1 50	31	46 50	206 00
Henry Eckman,	1 50	31	46 50	204 75
James Devine,	1 50	31	46 50	236 74½
Jeremiah Whitson,	1 50	31	46 50	415 00
Jacob T. Minster,	1 50	31	46 50	239 50
Thomas Walker,	1 50	31	46 50	319 12½
Philip Thomas,	1 50	31	46 50	256 93½
William Cline,	1 50	31	46 50	320 75
William Williams,	1 50	31	46 50	339 50
William Maurer,	1 50	31	46 50	463 62½
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JUNE.				
Alexander Rowan,	1 50	30	45 00	216 25
George Mullen,	1 50	30	45 00	220 25
James Blair,	1 50	30	45 00	206 00
Henry Eckman,	1 50	30	45 00	188 75
James Devine,	1 50	30	45 00	207 18½
Jeremiah Whitson,	1 50	30	45 00	336 25
Jacob T. Minster,	1 50	30	45 00	241 50
Thomas Walker,	1 40	30	45 00	262 87½
Philip Thomas,	2 50	30	45 00	252 75

A—CONTINUED.

NAMES.	Daily pay.	No. of days.	Amount paid each.	Amount of check roll.
William Cline, William Williams, William Maurer,	1 50 1 50 1 50	30 30 30	£ 45 00 45 00 45 00	287 00 298 37 $\frac{1}{2}$ 373 36 $\frac{1}{4}$
JULY. Alexander Rowan, George Mullen, James Blair, Henry Eckman, James Devine, Jeremiah Whitson, Jacob T. Minster, Thomas Walker, Philip Thomas, William Cline, William Williams, William Maurer,	1 50 1 50 1 50 1 50 1 50 1 50 1 50 1 50 1 50 1 50 1 50 1 50 1 50	31 31 31 31 30 31 31 30 31 31 31 31 31	46 50 46 50 46 50 46 50 45 00 46 50 46 50 45 00 46 50 45 00 46 50 46 50 46 50	166 50 127 00 164 50 711 25 229 00 387 93 $\frac{3}{4}$ 242 12 $\frac{1}{2}$ 235 25 245 00 249 75 293 25 254 86
AUGUST. Alexander Rowan, George Mullen, James Blair, Henry Eckman,	1 50 1 50 1 50 1 50	31 31 31 31	46 50 46 50 46 50 46 50	173 87 $\frac{1}{2}$ 187 18 $\frac{3}{4}$ 188 37 $\frac{1}{2}$ 161 00

James Devine,	1 50	31	46 50	213 44
Jeremiah Whitson,	1 50	31	46 50	278 12 $\frac{1}{2}$
Jacob T. Minster,	1 50	31	46 50	216 75
Thomas Walker,	1 50	31	46 50	222 25
Philip Thomas,	1 50	31	46 50	230 06 $\frac{1}{4}$
William Cline,	1 50	31	46 50	222 62 $\frac{1}{2}$
Williams Williams,	1 50	31	46 50	252 75
William Maurer,	1 50	31	46 50	319 76
SEPTEMBER.				
Alexander Rowan,	1 50	30	45 00	178 00
George Mullen,	1 50	30	45 00	171 81 $\frac{1}{4}$
James Blair,	1 50	30	45 00	167 56 $\frac{1}{4}$
Henry Eckman,	1 50	30	45 00	158 00
James Devine,	1 50	30	45 00	211 87 $\frac{1}{2}$
Jeremiah Whitson,	1 50	30	45 00	271 87 $\frac{1}{2}$
Jacob T. Minster,	1 50	30	45 00	213 81 $\frac{1}{4}$
Thomas Walker,	1 50	30	45 00	208 62 $\frac{1}{2}$
Philip Thomas,	1 50	30	45 00	189 62 $\frac{1}{2}$
William Cline,	1 50	30	45 00	216 62 $\frac{1}{2}$
Williams Williams,	1 50	30	45 00	247 25
William Maurer,	1 50	30	45 00	237 12 $\frac{1}{2}$
OCTOBER.				
Alexander Rowan,	1 50	31	46 50	144 06 $\frac{1}{4}$
George Mullen,	1 50	31	46 50	165 60 $\frac{3}{4}$
James Blair,	1 50	31	46 50	166 31 $\frac{3}{4}$
Henry Eckman,	1 50	31	46 50	147 31 $\frac{1}{4}$

A—CONTINUED.

NAMES.	Daily pay.	No. of days.	Amount paid each.	Amount of check roll.
James Devine,	1 50	31	46 50	183 28
Jeremiah Whitson,	1 50	31	46 50	186 21 $\frac{3}{4}$
Jacob T. Minster,	1 50	31	46 50	186 78
Thomas Walker,	1 50	31	46 50	181 56 $\frac{1}{2}$
Philip Thomas,	1 50	30 $\frac{1}{2}$	45 75	165 34 $\frac{3}{8}$
William Cline,	1 50	30 $\frac{1}{2}$	55 75	197 99 $\frac{1}{2}$
William Williams,	1 50	31	46 50	226 00
William Maurer.	1 50	31	46 50	218 58

B.

EXTRAORDINARY REPAIRS.

Final estimate of masonry at Little Conestoga bridge,	\$1,926 50	
Superstructure of do.	490 30	\$2,416 80
	<hr/>	
Superstructure of big Conestoga bridge,		2,451 45½
Masonry at mill creek bridge,	5,303 50	
Superstructure, do.	321 87½	
	<hr/>	
		5,625 37½
Superstructure of Pequea bridge,		113 58
do. of Downingtown do.		368 22
do. of Valley creek do.		341 81½
do. of Schuylkill do.		572 36
Expense in framing gap,		500 00
do. in removing quick sand below Parkesburg,		1,046 14¾
		<hr/>
		\$13,435 75½
		<hr/>

C.

REPAIRS.

Balance on hand as per report, November 1, 1836.	\$1 60
Amount drawn from treasury, from November 1, 1836, to October 31, 1837.	47,569 68
	<hr/>
	47,571 28
Amount applied to the payment of debts, due prior to 1st of March 1836.	\$496 53½
Amount expended from 1st of November 1836, to October 31, 1837.	47,054 10½
	<hr/>
	47,550 64
	<hr/>
Balance in hand,	\$20 64

Balance bro't forward,

\$20 64

DAMAGES.

Balance on hand as per report, of November 1, 1836.	\$6,505 00
Amount drawn from Treasury, from November 1, 1836, to October 31, 1837.	5,600 00
	<hr/> 12,105 00

Amount expended agreeably to resolutions of the former board,	450 00
Amount expended agreeably to resolutions of present board,	3,962 00
Paid Treasurer, March 24, 1837,	6,408 00
	<hr/> 10,820 00

Balance in hand,

1,285 00

MECHANICAL IMPLEMENTS.

Amount drawn from treasury,	5,000 00
Amount expended from November 1, 1836, to October 31, 1837,	2,343 30

Balance in hand,

2,656 70

ENLARGEMENT OF PARKESBURG SHOP.

Amount drawn from treasury,	\$3,000 00
Amount expended from Nov. 1, 1836, to Oct. 31, 1837,	755 22

Balance in hand,

\$2,244 78

ROPES.

Balance on hand as per report of November 1, 1836,	1,110 30
Amount drawn from Treasury,	6,500 00
	<hr/> 7,610 30

Amount expended from Nov. 1, 1836, to Oct. 31, 1837,	5,331 67
Paid Treasurer, March 24, 1837,	761 57

6,093 24

Balance in hand,

1,517 06

\$7,724 18

Balance bro't forward,

\$7,724 18

RETAINED PERCENTAGE.

Amount drawn from treasury,	598 00
Amount expended as per resolutions of the board,	\$98 00
Paid Treasurer, March 24, 1837,	500 00
	<u>598 00</u>

ENGINEERS, SUPERINTENDENTS, &c.

Balance on hand as per report Nov. 1, 1836,	\$419 50
Paid treasurer March 24, 1837,	419 50
	<u></u>

CONSTRUCTION.

Balance on hand as per report November 1, 1836,	\$3,136 20
Amount applied to payment of debts due prior to March 1, 1836,	\$30 12
Amount applied to payment of final estimate of Parksburg dwelling,	2,290 00
Paid Treasurer, March 24, 1837,	876 00
	<u>3,136 20</u>

MOTIVE POWER.

Balance on hand as per report of November 1, 1836,	\$1,293 52
Amount drawn from treasury,	11,874 75
	<u>\$13,168 27</u>

Amount applied to payment of debts due prior to March 1, 1836,	\$422 08
Amount applied to payment of debts due prior to November 1, 1836,	12,746 19
	<u>13,168 27</u>

Balance in hand,

\$7,724 18

Balance bro't forward,

\$7,724 18

NEW WORK ON OLD LINES.

Balance on hand as per report November

1, 1836,

\$3,000 00

Amount drawn from treasury,

7,000 00

\$10,000 00Amount applied to payment of
debts due prior to March 1,

1836.

\$526 70

Amount expended from Nov. 1,

1836, to Oct. 31, 1837.

6,692 05

Paid Treasurer, March 24, 1837, 1,726 74

8,945 49

Balance in hand,

\$1,054 51

Total balance in hand,

\$8,778 69

A STATEMENT

*Of balance on hand November 1, 1836, and amount drawn from
the treasury, from Nov. 1, 1836 to October 31, 1837.*

For Repairs,	\$47,571 28
" Damages,	12,105 00
" Mechanical implements,	5,000 00
" Enlargement of Parksburg shop,	3,000 00
" Ropes,	7,610 30
" Retained percentage,	598 00
" Payment of engineers, &c.	419 50
" Construction,	3,136 20
" Motive power,	13,168 27
" New work on old lines,	10,000 00
	<hr/>
	102,608 55

*Amount paid Treasurer and expended as per vouchers filed in
Auditor General's office.*

For Repairs,	47,550 64
" Damages,	10,820 00
" Mechanical implements,	2,343 30
" Enlargement of Parksburg shop,	755 22
" Ropes,	6,093 24
" Retained percentage,	598 00
" Payment of Engineers,	419 50
" Construction,	3,136 20
" Motive power,	13,168 27
" New work on old lines,	8,945 49
	<hr/>
	\$93,829 86
	<hr/>
	\$8,778 69

No. 10—H. R. 19.

Report of James D. Harris, Engineer, on finished lines on Susquehanna, above Duncan's Island.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN :

The following report relative to the finished lines of canal, on the Susquehanna, above Duncans Island, is respectfully submitted.

SUSQUEHANNA DIVISION.

The Susquehanna division, which comprises that part of the canal, between Duncan's Island and the Bridge at Northumberland, has been in good order generally during the past season. No damage was done by the spring freshet, and but few breaches have occurred during the season, to interrupt the navigation. The only breach of much consequence was caused by a heavy summer shower, which suddenly raised the small streams, when one of the culverts under the canal, by being filled with the driftwood brought down by the freshet, was so choked as to render it insufficient to discharge the water of the stream, and which consequently forced a breach in the bank. It was speedily repaired however by the supervisor.

The Navigation was partially interrupted for some days, for want of a sufficient depth of water in the levels, it having sunk so low in the Shamokin dam as not to afford the requisite supply. To give a supply for the remainder of the season, the usual mode was resorted to, by closing the schute, and throwing a bank of gravel across the stream, near the upper side of the filling of the dam, by which means the water in the pool was raised to a level rather above the comb of the dam, and the necessary quantity was thrown into the canal.

The area of surface through which the water percolated was equal to sixty feet in breadth, by 3780 feet in length, or equal to the length of the dam. This area is made up of coarse stone filling, through which all the water that passes over the gravel filling, at the upper extremity of the dam, escapes when the water is low, and it is found that any gravel deposited on this area is raked off by the ice freshets. Hence the necessity of raising the temporary bank, on the upper extremity of the dam every season. With a view to cut off this great amount of leakage, and make the dam permanently tight, or as nearly so as circumstances will permit, the following plan is proposed for the consideration of the board.

It is proposed that the spar covering be stripped of the stone, which is deposited on it, and that the whole surface of the spars be planked with a course of two inch jointed plank, from the lowest point which can be reached at a low stage of the water up to a point, twen-

ty feet in the rear of the comb, and joined here to a strong frame of crib work, ten feet wide, to be built on the spars, and secured to them by bars of iron, $1\frac{1}{2}$ inches square. This crib work to be built of heavy white oak timber, 18 inches square, filled with stone, and covered with six inch plank, rabbited into the crib, for a finish on the top. To this crib the planking of the spars should be tightly joined, and the whole will form a strong fixture, capable of resisting the freshets. The crib should be finished to a perfect level across the stream, and at least as high as the highest part of the comb of the dam. As the planking is completed the filling should be replaced, and as this is done, the stone ought to be broken so small as to pass through a four inch ring. On the top of this course of broken stone there should be a finish of slate gravel, which will be retained in its place by the crib work and prevented from being raked off by the ice. This appears to be the most effectual mode of making a permanently tight dam, and if well done it is believed there would be no failure at any future time in the supply of water on this division, and the annual expense of raising a temporary dam across the river, would be avoided.

The Estimate of the expense of this work is as follows :

17,500 cubic yards stone to be over hauled		
and broken,	at 50c	\$8,750 00
11,340 feet timber in cribs,	20	2,268 00
30,240 feet 6 inch plank to be pinned on,	12	3,628 80
2,017 cubic yards stone filling,	50	1,008 50
13,608 lbs. iron, $1\frac{1}{2}$ inch square bars,	8	1,088 64
151,200 square feet 2 inch plank,	3	4,536 00
21,588 lbs. 6 inch spikes,	8	1,727 04
7,000 cubic yards gravel,	40	2,800 00
		<hr/>
		\$25,806 98
Ten per cent. for contingencies,		2,580 69
		<hr/>
		\$28,387 67
		<hr/>

It will be necessary to take down and rebuild the head of the first lock above Liverpool, and renew six of the lock gates at different points on the line. The excavation in the bottom of the canal, for the purpose of deepening it, between the aqueduct at Middlecreek and the first lock below it, should be resumed and completed so soon as the navigation closes. This work may all be done during the ensuing winter.

If the usual plan of graveling should be pursued, the estimate of repairs required on this division, for the next year, will stand as follows :

Repairing lock at Liverpool and lock gates,	\$2,750 00
Excavation in bottom of canal,	1,275 00
Graveling Shamokin dam,	2,000 00
Miscellaneous expenses,	3,000 00
	<hr/>
	\$9,025 00
	<hr/>

NORTH BRANCH DIVISION.

This division extends from Northumberland to Lackawanna creek.

The ice freshet of last spring formed a breach in the bank of the canal, between the Nanticoke dam and the guard lock, at that place, and the sand and other alluvion was deposited, to the depth of $1\frac{1}{2}$ feet between the breach and the lock. So soon as the freshet subsided, the breach was repaired, so as to permit boats to pass, but the sand which was deposited in the canal, prevented the usual supply of water from reaching the guard lock, at common stages of the river. The inadequacy of the supply was experienced in the month of August, and continued for some weeks. By closing the sluice, and raising a bank on the filling above the spars of the dam, the supervisor was enabled to fill the levels about the 1st October. The pool of the dam was in this way raised to a level, $1\frac{1}{2}$ feet higher than the comb, which carried a sufficient supply of water over the deposit of sand, in the entrance of the canal.

The guard lock is situated about ten chains below the dam, and so long as this state of things exists, the canal bank for this distance, must be exposed to the force of the freshets, and the Canal, as far down as the guard lock, will be liable to be filled with sand. To prevent effectually the recurrence of similar results, the guard lock when rebuilt, (which must be done soon) should be placed immediately opposite the dam.

If the Nanticoke dam were planked upon the same plan proposed for tightening the Shamokin dam, the supply of water would be rendered more certain, and the annual job of gravelling would be measurably obviated. The expense of it is estimated at \$5,000.

But few breaches have occurred on this division during the present season, and the only interruption to the navigation worth noticing, was occasioned by a failure in the supply of water at the Nanticoke dam. The canal between the dam and Lackawanna has been uniformly in good order, since the spring freshet.

In obedience to the verbal instructions of the Canal Commissioners, when on this line, the sources from which the canal is to be supplied with water, between the Nanticoke dam and Northumberland, a distance of fifty-one miles, have been examined, to enable me to give an opinion with respect to the adequacy of the present feeders. The only sources of supply which need be taken into view, are the Susquehanna and Fishing creek. The former is now introduced at the Nanticoke dam. The latter intersects the canal a short distance below Bloom, and about twenty-two miles above Northumberland.

A measurement of the last mentioned stream was made on the 5th October, with as much accuracy as circumstances would admit of, by my principal assistant, (Dr. J. Paxton,) and the result gave forty cubic feet per second, or 2400 cubic feet per minute, after making due allowance and deductions for any augmentation of discharge at the moment, beyond that which would occur at a time of extreme drought, and for what might be lost by the leakage of the

dam. If this measurement be correct, which there is no reason to doubt, the account would stand as follows :

cub. ft. per min.

Allowing 60 cubic feet per mile per minute, for evaporation, soakage, and leakage $\times 22$ miles,	1,320
Allowing also that it would be necessary to use three locks full in each hour to pass the trade, after the completion of the entire line, and that the demand for each boat would be measured, by a lock of 11 feet lift, and 17 by 90 feet in the chamber, or 16,830 $\times 3=50,490$ per hour,	841
Demand,	2,161
The discharge of the stream per minute,	2,400
Surplus per minute,	239

This is exclusive of what might be gained by a reservoir in the valley of Fishing creek, to meet any unforeseen contingency ; such as an increase of trade and enlargement of the canal. So that this stream may be relied upon to feed the twenty-two miles of canal between the lock at Bloom and Northumberland, with an active trade upon it.

The length of the feeder would be seventy-one chains, and the height of the dam on the creek eight feet. The estimated cost is as follows :

Dam and schute,	\$9,000
Canal 20 feet at bottom, 4 feet deep,	4,000
Three bridges,	1,500
Fence,	600
Head gates,	3,000
	<u>\$18,100</u>

In the expense attending the construction of this feeder, must be included, the damage to Foulk's mill, above the head of the feeder, and to Colt's mill, at the canal. The former would be destroyed by the back water of the dam. As the water for the latter is taken out of the creek below the proposed feeder, it would be injured only at a time of drought, when the water would be insufficient for both the mill and the canal.

By keeping a strict watch over the dam at Nanticoke, and taking timely steps to have it graveled yearly, before the water sinks much below the ordinary level in the early part of the summer, it is believed that a full supply of water may be taken in at that point, for the canal thence to Northumberland, in the present state of the trade, or under any probable increase of trade, so long as the continuous line of the North Branch canal is limited by the Lackawanna creek. But if it is the settled intention of the state to complete her improvements to the New York state line, (which may be presumed) it will then

be difficult, if not impracticable to force on, from the Nanticoke dam, the supply of water which will be required for the lower section of the canal. To meet this emergency, it would appear to be a wise provision to secure a supply from some other source to be brought in at a point midway on the line.

The plan of taking in water at Berwick, by making a dam in the Susquehanna at the Rocky Island, three miles above that place, and fifteen miles below the Nanticoke dam, of such height as to admit of introducing the water below the lock at Berwick has been suggested and considered. The scite for a dam is favorable, it being principally rock. But the same objection may be made to a dam here, which is opposed to dams generally in the river as forming an obstruction to the descent of arks, and rafts, and as being exposed to severe damage from freshets, and it may with propriety be said that they ought to be erected only where indispensable, or where a decided advantage is to be gained by their adoption. It is considered better to take in water at Fishing creek than at Berwick, for this and the additional reason that the former place is nearer midway on the whole line to be fed than the latter. The distance from Nanticoke dam to Bloom is twenty-nine miles, thence to Northumberland twenty-two miles. The distance from Nanticoke dam to Berwick is eighteen miles, thence to Northumberland thirty-three miles. Taking it for granted that the State will proceed to complete the chain of improvement from Northumberland to the State line, it is deemed good policy to secure the feeder at Fishing creek at once. By deferring this step the cost may be much increased, as other water privileges will in all probability be soon improved which will be damaged by the construction of the feeder. If the board approve of this plan of taking in water, an act of assembly that would give authority to the Canal Commissioners to locate the feeder and settle the damage prospectively, is all that appears immediately necessary to be done.

In a recent inspection of the line from Nanticoke dam to Northumberland, the state of the locks claimed my principal attention. They are built wholly of timber, and are in such a decayed condition as to render their renewal absolutely necessary, without loss of time. The number of locks which will require to be rebuilt, or to be supplied by others, is eight, including the guard lock at Nanticoke dam. It is thought best to build them on entire new scites adjoining the present locks, that the business of the canal may not be interrupted whilst the work is going forward, and the location of the present locks favors this mode. The sum which may be necessary to accomplish this work in a substantial manner, and cover the expense of slight alterations in the prism of the canal attendant on it, is estimated at \$80,000, of which \$40,000 will be required within the next season. The locks should all be put under contract as early as practicable in the spring, so that the materials may be transported to the respective scites of the locks during the next summer, and that every thing may be prepared for their erection by the fall. When the navigation closes, the water may be taken out of the canal, the foundations sunk, and the walls raised to the surface of the water in the lower level during the fol-

lowing winter, so that they can be completed during the summer of 1839. The irons generally of the present locks may be used for the new. If those locks were renewed, and two extra guard locks built between the Nanticoke dam and Beach Grove, as recommended in my last report, the North Branch canal would be placed in perfectly safe condition, and capable of withstanding the freshets of the river. Those two guard locks would cost \$20,000 in addition.

A number of the bridges on this division are in a dilapidated state, and will have to be renewed soon.

A towing path bridge is needed across the Nanticoke pool, and to perfect the navigation, and prevent further damage to the lands on the borders of the pool, the towing path should be completed and well protected with stone. All of this work properly belonged to the construction of the canal, but has as yet been deferred.

The sums estimated as necessary to place the North Branch division in perfect order, are as follows, and may be denominated :

EXTRAORDINARY REPAIRS.

Tightening Nanticoke dam,	\$5,000 00
Renewing eight locks,	80,000 00
Two extra do. (guard locks,)	20,000 00
Rebuilding bridges,	3,000 00
Towing path bridge over the Nanticoke pool, and road bridge connected,	30,000 00
Towing path along pool,	10,000 00
Amount,	<u>\$148,000 00</u>

ORDINARY REPAIRS.

Repairs of bridges,	\$2,000 00
Gravelling Nanticoke dam, if the permanent plan should not be adopted,	1,000 00
Repairs of schute,	3,500 00
Other repairs,	10,000 00
Amount,	<u>\$16,500 00</u>

The last named amount is considered necessary for the current and ordinary repairs of the next year, on the North Branch division, and is intended to cover the expense of rip raps and deepening the canal at certain points, &c.

WEST BRANCH DIVISION.

The West Branch division extends from Northumberland to the State dam on the Bald Eagle creek.

The navigation on this line was in good condition from the opening of the season until the fourth of July, about which time a breach took place below Williamsport, and since then several others have occurred at different points on the line, between Muncy and Dunnsburg, at such intervals of time that the business has been seriously interrupted.

The banks of the canal will have to be further strengthened and secured, during the next season, by means of rip-rap at several points. The sand will have to be removed, where it has been washed into the canal by rains, and at a few places the canal will have to be deepened, by removing bars which have been deposited. A few of the lock gates on the lower part of the line will have to be renewed.

The outer wall of the schute at the Muncy dam was injured by the spring freshet, to such extent as to render its passage hazardous for a time. This damage has been repaired, and cribs have been sunk adjoining to the schute, below the dam, and for one hundred and sixty feet in length in the middle of the river, at a point where the dam appeared to have settled, as a security against further injury.

Some damage was occasioned to the dam at Dunnsburg by the spring freshet, which tore off and removed a part of the breast plank. As a security against further damage, and for the purpose of retaining the stone filling in the dam, a row of piles was driven along the front of the dam, under the comb, for a part of its length, and for two hundred and forty feet at the south-west end a crib has been sunk, to supply the place of the breast, removed by the freshet, and to secure the foundation.

The sum which may be required for the repairs of this division, during the next year, is estimated at \$15,000.

GENERAL ABSTRACT OF REPAIRS.

Susquehanna division,	\$9,025 00
North Branch division,	16,500 00
West Branch division,	15,000 00
	<hr/>
	\$40,525 00
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Numerous applications have been made for the payment of arrearages for work done on the Wyoming line and Lycoming line, during their construction. A list of those claims I enclose, and I am of opinion that all embraced in it are correct. As most of the labor for which the applicants claim to be paid, has been done from two to three years, it appears but just that early provision should be made for their payment.

The amount of claims on the Wyoming line,	\$710 15
do. do. do. below Nanticoke,	196 12
do. do. Lycoming line,	1,994 12
	<hr/>

Amount,	<hr/> \$2,900 39 <hr/>
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Respectfully submitted,

JAMES D. HARRIS,

Engineer.

TOWANDA, October 28, 1837.

No. 14—H. R. 23.

Report of S. W. Mifflin, Engineer, upon Gettysburg extension.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN:

I submit to your consideration my first annual report upon the Gettysburg extension of the Pennsylvania rail way, in full confidence that all friends of our State improvements will find a source of gratification in the progress which has been made in the work, during the discouragements of the past year.

My appointment to the charge of this work took place on the 18th April last, six months after the contracts for the first division had been made. In order to make a satisfactory report upon their present state, a glance must be taken at the principles involved in the original location and the circumstances connected with it.

In compliance with your instructions, the preliminary reconnoissance and experimental surveys of my predecessor, I. P. Baily, Esq. were commenced about the 10th day of June, 1836, and continued without interruption during the summer. In the course of this examination every line was surveyed which could be deemed at all practicable, and the location of that portion included between Gettysburg and the summit of the south mountain, was only effected after a complete and thorough investigation of the comparative merits of at least four routes.

The act of the Legislature respecting this improvement, contemplated a junction with the Baltimore and Ohio rail road at a point in the vicinity of Hagerstown, or Williamsport. The engineers of the Baltimore and Ohio rail road by having ascertained that no inclined planes and no grade exceeding fifty feet per mile would be required between Hagerstown and Pittsburg, or Wheeling, it was therefore assumed as a fundamental principle whereon to base all calculations, that no grade should exceed fifty feet per mile.

The perfection to which locomotive power has arrived, removes all the objections which, but a few years since, would have been urged against the adoption of this grade. Eight years have now elapsed, since the first location of the Columbia and Philadelphia rail way, and during that time Pennsylvania has gained an amount of experience which may amply console her for the imperfections which can now be discovered in that great work—imperfections which have been unthinkingly employed to cast a shade upon the tomb of its honored projector, by those who know not the embarrassments with which he contended, nor the dim light which science then shed upon a track she has since so brilliantly illuminated.

But experience has fully shown that locomotive power was not then properly estimated, and that the adoption of higher grades would have avoided the inclined planes, and consequently removed the principle obstacle to transportation, and the greatest impediment to travelling, which this road affords. Profiting by this experience, the Gettysburg road was located upon different and more certain principles; and although the south mountain intervenes between its extreme points, with a summit level of seven hundred and eighty feet, it has been overcome without inclined planes and, higher grades than fifty feet per mile, and with a minimum radius of curvation nearly double of that employed on the Columbia road.

In a work of so much consequence, permanency must be regarded as an object of vital importance. Experience has fully proved the impolicy of constructing roads in a temporary and unsubstantial manner; the great expense incurred by repairs, having been found to diminish, very materially, the profits of a road, and the delays and dangers incurred by breaches, have contributed as much as any other cause to injure the most fruitful source of revenue—passenger transportation.

Influenced by these considerations, wooden bridges were in every case rejected, and embankments of earth, enclosing arched stone culverts, substituted; and although the first cost of such superstructure is greater than that made of wood, the repairs upon the latter would, in a short time, equal the difference, and while the one would be increasing daily in strength and solidity, the other would undergo a slow but sure decay.

Such were the plans and principles upon which the construction of the road was commenced and conducted up to the time of my assuming charge of it, in April last. My confidence in Mr. Baily's judgment inclined me from the first to make as few alterations as possible in the original design of the work, a determination in which I was fully confirmed after a full investigation of its merits. In one instance only have I departed materially therefrom, by providing, at the earnest solicitation of residents in the vicinity, an increased waterway for the passage of West Marsh creek. I was the more readily induced to this measure by the small amount of masonry which occurs upon this division, there being but fifteen culverts, comprising twenty-three arches, upon the whole distance of twenty-two and a half miles, of which only three, Nos. 13, 14, and 15, exceed materially in length, the width (24 feet) of the graded surface of the road.

I will now proceed to show the progress which has been made in the work under contract:

The abutments of the three culverts last mentioned, together with those of No. 6 are finished, excepting a part of one abutment at Myer's mill, No 13. Three others (Nos. 1, 10 and 11,) are entirely finished, and No. 2, consisting of three arches at Willoughby run is finished, with the exceptions of parapets and coping.

Whilst the superior execution of the masonry gives entire satisfaction, merited praise must not be withheld from the able and efficient contractors, to whose exertions under discouraging circumstances it

owes its present solidity and beauty. Good stone is unusually scarce, the prevailing red slate formation furnishing a material which cannot be relied on, either for strength or durability. These defects caused its entire rejection, and it was only after laborious search that another rock was found possessing every quality which could render it valuable for the purposes to which it was to be applied.

In consequence of the rejection of the red slate as a material for building, the contractors, for the remainder of the masonry, were reluctantly compelled to abandon their contracts. The work has, however, all been re-let at somewhat increased prices, with the exception of No. 3, over North Marsh creek, but at so late a period that no work has been done on any of them except West Marsh creek, of which the foundations were all laid by the original contractor before he abandoned it. These circumstances have greatly retarded the execution of the work, but as was before observed, the amount of masonry on the line was so small that no importance need be attached to them in a pecuniary point of view.

Owing to the promptness with which the work was commenced, and the general activity of contractors, I am able to report a much larger portion of finished work than could have reasonably been expected under the disadvantages with which it was necessary to contend, resulting from the fact that no appropriation was made by the last Legislature for prosecuting this work, and as a necessary consequence, those who had undertaken it, and who expected to remain as they were at first, unlimited in the number of men which they would be permitted to employ, were depressed in spirits as well as limited in means. Yet, even in this discouraging state of affairs the work has progressed rapidly, as will be seen from the annexed statement of each section exhibiting the amount of work done up to November 1st. 1837, and the relative proportion in length of finished and unfinished road.

SCHEDULE OF MASONRY.

No. of Culverts.	No. and size of Arches.	Locality.	Distance from Gettysburg.	Present Condition.	Cost.
1	1 of 12 feet	Steven's meadow	0	Finished	\$1,966 36
2	3 of 14	Willoughby run	1 $\frac{1}{4}$ miles	Arches closed	3,184 05
3	3 of 20	N. M. creek	3 $\frac{1}{2}$	Not commenced	
4	2 of 12	Heintzelman's run	4	"	
5	2 of 12	"	4 $\frac{3}{4}$	"	400 00 materials
6	1 of 12	Beesecker's run	5 $\frac{1}{2}$	Abutments finished	766 25 [delivered
7	1 of 6	D. Mickley's	6	Foundation laid	21 28
8	1 of 20	P. Mickley's	7	Not commenced	
9	3 of 20	W. M. creek	7 $\frac{1}{4}$	Abutments laid	800 00
10	1 of 6	Beesecker's mill	7 $\frac{3}{4}$	Finished	1,000 00
11	1 of 12	C. Spring road	9 $\frac{3}{4}$	"	1,569 77
12	1 of 20	Myer's road and race	10 $\frac{1}{2}$	Not commenced	
13	1 of 12	Myer's run	10 $\frac{1}{2}$	Abutments nearly done	1,296 09
14	1 of 25	Tom's creek	14 $\frac{1}{2}$	Abutments finished	7,881 60
15	1 of 6	Mina Branch	21	"	751 00
					\$19,636 31

SCHEDULE OF GRADUATION.

No. of sections	Cub. yds. emb'd.	Excavation.	Solid rock.	Detached rock	Grubbing.	Drains.	Cost.	Chains graded.
1	28,251	9,650	9,927	7,609	240	169	\$13,179 72	56.75
2	13,391	1,856	5,832	2,846	324		6,139 56	16.25
3	41,132	8,419	18,181	8,604	100		19,191 76	25.50
4	16,886	6,952	12,581	9,340	272	110	12,084 54	35
5	18,736	80	2,230	250	72	142	3,140 20	12
6	17,180	10,654	2,401	3,772	270		5,469 98	42.50
7	28,438	9,711	7,798	8,683	100	374	11,910 34	32
8	50,643	12,112	19,270	11,878	185	202	22,210 22	52
9	34,771	10,151	13,949	6,639	150	464	15,350 83	42
10	24,304	9,466	6,921	4,282		129	9,169 87	25.5
11	19,903	12,767	4,869	5,595		70	8,552 70	40
12	18,595	8,401	4,077	3,701	15	160.5	6,860 00	56.50
13	17,066	18,763		2,809	40	200	5,537 25	86
14	15,249	6,804	4,268	3,451	110	26	6,171 20	38.50
15	16,781	8,079	2,624	5,003	50	255	6,382 22	62.50
16	15,486	5,025	2,590	5,534	77	104	5,263 19	65.33
17	13,987	6,508	4,439	4,298		80	6,588 33	81
18	17,533	4,469	4,556	4,205		126	5,640 60	33.67
19	17,498	3,816	8,176	2,922	16	145	6,173 40½	56
20	35,541	10,093	16,870	10,025		54	19,139 16	83
942 chains = 11.75 miles.								
Whole distance,				22.00	Add for culverts,		19,636 31	
Finished,				11.75				942 ch'ns
Remaining unfinished,				10.25			\$213,761 38½	

By this statement it will appear that more than one half of the whole length of road under contract has been graded and about one third of the masonry finished at a cost of somewhat less than \$214-000. The portions of which this aggregate is composed have not been selected with reference to their easy completion, but have been chosen indiscriminately by the contractors, and embrace parts of some of the deepest excavations and embankments on the line.

I have not, as yet, sufficient data for furnishing an exact estimate at contract prices, of the amount of work yet to be finished, some of the excavations having been found to contain more rock than was anticipated, and others which were supposed to consist entirely of rock, having proved, upon examination, to consist almost wholly of soft clay. The embankments on the line being unavoidable, and many of the excavations being made with a view to furnish materials for embankment, I have endeavored, without departing from the original amount of grading and curvature, to diminish the excavation and procure materials for embankments from other sources. This has been done to a considerable extent on sections No. 3, 4, 5 and 7, and provision has been made for similar reduction on other sections, should the nature of the rock excavation require it.

The heavy grades found necessary upon this road form the principal objection that has been urged against its utility. Instead of investigating analytically the resistance to motion offered by curves and high inclinations, it will be much more satisfactory to take the results of long experience upon the Philadelphia and Columbia road as the basis of a simple calculation by which to determine the proper load of an engine upon any grade whatever.

By the kindness of A. Mehaffy, Esq., superintendent of motive power on the Philadelphia and Columbia road, I have been furnished with the necessary information for this purpose consisting of a full account of the number, size, and weight of engines, the dimensions of cars, the number composing a train, and the length and inclinations of the heaviest grades upon the road. From this statement it appears that one locomotive drawing thirty-five loaded cars, and weighing in all one hundred and seventy-five tons, can pass with ease at the rate of ten miles per hour, a portion of this road the grade of which is thirty-two feet per mile, for a distance of several miles.

In order to calculate from these data the power of an engine upon a grade of fifty feet per mile, we must consider the nature of the resistance to be overcome. When an engine is moving upon a level road its power is exerted solely in overcoming the unavoidable friction of the different parts of the train. If we then suppose the road to be gradually inclined until the power of gravity is sufficient to overcome the friction and cause the train of cars to *descend*, it is evident that the engine must exert double the power in *ascending* this inclination that it did upon the level road; i. e. it must overcome the primary friction, and a resistance from gravity which is equal to that of the friction, and for every increase of inclination an additional power will be required, proportionate to the increase of inclination. The degree of inclination which will overcome the friction of a train

of cars depends, of course, very much upon their construction. In the most approved models it has been found to vary from eighteen to twenty-four feet per mile, making the average twenty-one feet per mile. Hence, if the resistance upon a level road be one, upon a grade of twenty-one feet it will be two, and upon a grade of forty-two feet it will be three, and so on. By this formula the proportion of resistance between grades of thirty-two and fifty feet per mile will be as two and a half to three and a half nearly, or nearly five to seven; hence the power of the above engine upon a fifty feet grade will be five-sevenths of one hundred and seventy-five tons, equal to one hundred and twenty-five tons, or deducting the weight of engine, about one hundred and fourteen tons gross weight, of train to be drawn at the rate of ten miles per hour.

It will not be expected that I should express my opinion upon the comparative merits of the two routes beyond the mountain. Since the experimental surveys of an engineer, however satisfactory to himself, can be of little service to a successor who has had no opportunity of examining them in connexion with the ground over which they were traced. For this reason, as well as for satisfying the public mind in that vicinity, I would respectfully suggest that a new survey be made west of the mountain, before a final decision on that part of the road be adopted.

It is certain, however, that either of the above routes will embrace some heavy sections that will require more than one season to complete them; and I would, therefore, recommend that provision be made for putting these under contract the ensuing season, in order that they may be finished at the same time with those now in progress.

With due respect,

S. W. MIFFLIN.

ENGINEER'S OFFICE, Gettysburg, }
November 1, 1837. }

No. 16. H. R. 25.

Report of Charles T. Whippo, Engineer, upon Beaver and French Creek divisions.

MOSES SULLIVAN, Esq.

President of the Board of Canal Commissioners.

SIR,—In the early part of July last an extraordinary flood took place in the Beaver river and French creek, which very seriously injured the public works upon these two streams.

On the Beaver division, dams No. 2 and 3, which had been considerably damaged by the ice of last winter and spring, were still more injured; and the towing path along the pools, and other parts of the line, also suffered.

The feeder dam on French creek at Bemus' mill, was completely wrecked. The abutment was undermined, and the towing path along the pools greatly abraded, and in some places entirely washed away.

A short time after these disasters, I received a resolution from the board, directing me to make estimates of the cost of repairing the damage done by this flood, and putting the lines in good repair.—These estimates have been made, and I now submit them to the board.

Estimate of Beaver Division.

The towing path along Shenango pool above Newcastle, was not very seriously injured, and has been partially repaired during the past summer, and will cost, \$1,000 00

BRIDGE OVER THE SHENANGO AT NEWCASTLE.

During a very high flood which took place in the fall of 1835, the water rose to such a height, that fears were entertained that it would break over the towing path, and inundate the town of Newcastle, which would not only have destroyed a large amount of private property, but would, in all probability, have done extensive injury to the canal. Under this state of things, it became necessary to cut away the embankment at the west end of the bridge, and let the water round the west end of the feeder dam. This was accordingly done by the supervisor; and as the material was light

and sandy, it was but a short time till the course of the river was changed and ran entirely between the west end of the bridge and the adjoining high ground, making a channel upwards of 200 feet in width, and rendering the bridge entirely useless and impassable.

The following summer, by the advice of the president of the board, and under my direction, the feeder dam was extended about 300 feet in length, which increased the width of the pool about the same distance. The bridge now extends from the eastern side of the pool, about half way across it, leaving a space of at least 300 feet between the western end of it, and the western margin of the pool. The people have thus been deprived of a bridge. When we commenced building the feeder dam in 1834, the bridge across Shenango at this place was less than 200 feet in length, built upon a very simple plan, and cost from £00 to 1200 dollars. This bridge was removed to give place to the public works; and since, there has been no means of crossing the Shenango, except by fording or ferriage, except in the winter, when, at times, the ice has been strong enough to cross upon it. Under these circumstances, it would seem to me to be the dictate of common justice, that a bridge should be extended from the western abutment of the present bridge, to the western margin of the pool. The span of the bridge should be about 200 feet in length, and the residue of the distance of about 100 feet, should be embankment, the cost of which will be—

Say for abutment, 600 perches, at \$5 00	\$3,000 00
Superstructure, 200 feet	20 00 4,000 00
Embankment 5,000 yards	20 1,000 00

8,000 00

Aqueduct, No. 1. One abutment and a pier were undermined last spring, and the repairs will cost,

1,712 00

Locks No. 1, 2 and 3, will require some slight repairs, such as tightening the gates and repairing the bridges, and will cost, say \$100 00 each,

300 00

Lock, No. 4, will require considerable repairs in order to make it permanent. Several of the stones just below the upper gates, in consequence of not having sufficient beds, have become loose, and have been forced partially out by the pressure of the water in the rear. It will be necessary to remove the embankment, and take up a portion of the lock and rebuild it; which will cost altogether,

2,750 00

No. 5, will also require some repairs, such as tightening the gates, taking up and relaying some of the stones, pointing the walls with Roman cement, &c., and will cost,

700 00

No. 6, will require slight repairs, costing say,	100 00
No. 7, was injured soon after it was built, by the pressure of the embankment against its walls, by which its walls were forced in about three inches, and some of the stone broken and injured. The embankment in the rear of the walls must be removed, and the stones replaced, which will cost,	1,910 00
Repairing canal and towing path from Newcastle to lock No. 7, eight miles, at \$300 00 per mile,	2,400 00
Dam No. 2, was somewhat injured by the heavy ice floods of last spring, which exposed it the more to the great flood of July last, at which time it was a good deal damaged. The spars in many places, were forced off, and the timbers of the body of the dam broken and deranged. This damage has been partially repaired during this summer, and fail, but not paid for. The whole cost, when the work is completed, will be,	3,320 00
Dam No. 3, on account of its being much longer than No. 2, was not so much injured. The spars, for about 100 feet in length, were forced off, and a portion of the stone filling washed out; cost of repairing it will be,	1,800 00
The towing path bridge over the Conoquenessing, has been very seriously injured. This bridge is nearly twenty feet above the bed of the stream; and the water raised so high as to bring the flood wood in contact with the superstructure, which nearly forced it off the piers; and the piers were also very much injured. To make this permanent, we shall have to expend,	1,740 00
Towing path between dam No. 3 and 4 will be a heavy job. This becomes necessary, both from the settling of the bank, and the raising of dam No. 4, and will cost \$1,000 per mile on the average, for seven miles,	7,000 00
Raising dam No. 4, in order to increase the depth of water at the head of the pool, and to gravel and otherwise repair the dam, will cost	6,260 00
Dam No. 5 requires to be sparred, and otherwise repaired, which will cost	1,600 00
Locks No. 9, 10 and 11 will require slight repairs; say cost \$100, each,	300 00
Dam No. 6 has some spars off, and some filling washed out, and will cost to repair,	200 00
Towing path along pool of dam No. 6, will require considerable repairs, having been a good deal abraded by the floods of last spring and summer; cost	2,140 00
Locks No. 16 and 17. These, and particularly the 17th, is a good deal out of repair. It is the outlet lock into the Ohio river, and is frequently entirely	

covered with water, in consequence of which, a good deal of sand and gravel has been washed into it—the gates have been floated off their hinges, and considerable other injuries done. A dam will have to be made at the lower end of it, the water pumped out, the gravel and sand removed, and the repairs to the gates be made. These, together with the repairs on the 16th lock, will cost

5,660 00

Total cost of repairing line,

\$48,892 00

This sum, I have no doubt, will be sufficient to put the line in complete repair; and this ought to be done before the main line to Erie is completed, and before the Pennsylvania and Ohio canal is completed to the Ohio canal: because we ought, by all means to be in a perfect state of readiness, to avail ourselves of the commerce which these two canals will bring in, on their completion.

But as neither of these lines will be finished under two, and perhaps three years, it will not be necessary to expend the whole of this sum during the next season, as the navigation can be kept up with a less sum. It should be observed, however, that while the repairs are making, the water will have to be taken out, and the navigation stopped; and as the business is small now, and will probably be greater at any future time, it may perhaps be attended with less inconvenience to make the repairs next summer, than at any time afterwards. It is with this view, that I have made the estimate so full; but if it should be thought proper to postpone the complete repair of the line to a later period, there may be deducted from this estimate the following sums, viz:

On lock No. 4	\$2,000 00
“ 5	400 00
“ 7	1,500 00
Dam No. 2	1,500 00
Towing path between dams No. 3 and 4,	4,000 00
Raising and repairs dam No. 4,	2,000 00
On locks No. 16 and 17,	2,000 00
	<u>\$13,400 00</u>

Leaving the sum to be appropriated next winter \$35,492 00

Which would be sufficient to protect all the works upon the line and keep up the navigation till another season, when the balance may be appropriated, and the residue of the work completed. My opinion, however, is that the whole sum had better be appropriated at once and the repairs all made next season.

Estimate of the French Creek Division, dam No. 1.

This requires only a few spars and iron bolts, and some stone filling, and will cost.

120 00

Lock No. 4. The walls of this lock are too thin, in consequence of which they have collapsed by the

pressure of the earth on the outside. It will have to be taken up from the foundation and entirely rebuilt, which will cost	8,700 00
Dam No. 2 is in a precarious situation. The reaction of the water has made a deep excavation at the toe of the dam, and should there be heavy floods during this fall and next spring, the probability is that it will go away. If, however, it should become no worse than it now is, it may be repaired in time of low water for	4,800 00
Dam No. 3 is in about the same situation as that of dam No. 2, and will require the same amount of repairs.	4,800 00
Dam No. 4 was carried away by the floods of 1835, and as the foundation was bad, and the expense of rebuilding great, it was thought best to dispense with it and substitute a canal, which was accordingly located, and put under contract in the spring of 1836. The work, however, went tardily on, and the sections, into three of which the line was divided, are not yet completed, and will cost as follows :	
Section No. 1, of thirty-three chains in length,	6,480 00
“ 2 “ “	3,150 00
“ 3 “ “	4,845 00
Lock section No. 6, fifteen perches long, will cost	3,085 00
Dam No. 5 is also in a very precarious situation, and will very probably go away with the fall or spring floods. If it could have been repaired last summer it would have cost	5,925 00
Dam No. 6 is in about the same situation as dam No. 5, and may very probably go off during the fall or spring. It will cost to repair it	7,300 00
Dam No. 7 is in much better condition than most of those above. A few spars, some iron bolts, and a few yards of protection wall will be sufficient to repair it, which will cost	1,525 00
Dam No. 8 can be repaired with an expense of	3,626 00
Dam No. 9 is considerably undermined at its toe, and must be repaired by sinking a crib in the deep water below it, at a cost of	4,616 00
Dams No. 10 and 11 have been but little injured, and can be repaired for	2,000 00
Lock No. 15 might stand for a few years ; but as it is now unsafe, and must soon be rebuilt, it was thought best to include it in this estimate. It will cost	10,650 00
The embankment necessary to raise the towing path and canal banks, has been carefully estimated, and amounts to 17,720 cubic yards, which, as the materials must be good, and, in many instances, will have to be hauled a considerable distance, is put at twenty-five cents per yard. This amounts to	4,430 00
Total cost of repairs on this line,	<u>\$76,052 00</u>

It should be mentioned here that a large amount of damages are claimed upon this line by land holders, for injury done to their farms; and in order to be able to communicate to the board, some information upon this subject, I directed Mr. Wood, my assistant for that line, to go on to the ground and collect all the facts he could in relation to the matter.

He attended to this duty and wrote to me as follows, under date September 30. "On French creek along the pool of dam No. 1, according to the best information obtained from disinterested persons, it appears there are five hundred and thirty-four acres at least so much affected by the water of this pool, as to render it useless, or nearly so. This quantity is owned by twenty-three individuals, two of whom owning ninety-five acres each, have received \$400, alleging, however, that they have not been compensated to half the amount of damage sustained, not being aware at the time they accepted it, of the extent of injury those dams would produce, when completed and the water let in.

From the same dam up Coneaut creek may be safely estimated eight hundred acres rendered useless, and for which no compensation has been received. Along the pool of dam No. 2, at a low estimate there are one hundred and thirty-six acres, with some buildings much injured. This property is owned by six individuals, five of whom owning one hundred and twenty-four acres, have received for damages nine hundred and forty-five dollars; but they too feel dissatisfied with the amount, for the same reasons mentioned above.

The owners of the property above mentioned estimate their lands high, from thirty-five to fifty dollars per acre. In some cases, perhaps, on small bottom farms, where two thirds of the land is rendered useless, leaving the balance too small for a farm, the above estimate may not be too high, all disadvantages considered; but I believe the above mentioned lands, amounting to 1470 acres may be fairly estimated at twenty dollars per acre, at which price it would amount to \$29,400, from which deduct amount paid, viz:

1,345

And we have the amount which by this calculation is still due land holders

28,055 00

Now if this sum be fairly due these land holders it ought to be paid to them; and I have no doubt but the Legislature would pay it, if the case were laid fairly before them. In this event the whole amount for repairs and damages would be,"

104,107 00

From the great number of complaints which I have heard in passing up and down this line, I am fully of opinion that the above statement of Mr. Woods is correct.

Estimate of the French creek Feeder.

FEEDER DAM AT BEMUS' MILL.

This dam, as I mentioned before, was greatly injured by the flood of July last; and also the abutment on the east side of the creek, and the towing path along the pool. An estimate has been made for extending this dam one hundred feet and repairing it, and repairing the abutment and towing path along the pool. An estimate has also been made for continuing the feeder to the islands a little below M'Guffin's falls, and making a new dam there three hundred feet in length, and a guard lock. This would increase the length of the feeder three hundred and sixty-five perches.

The cost of repairing and extending old dams, and repairing abutments and towing path above dam amounts to

19,143 00

Cost of extended line, new dam and guard lock \$28,921

Difference in favor of repairing, &c. of . 8,778

AQUEDUCT ACROSS FRENCH CREEK.

This structure is very much out of repair. The eastern abutment is cracked, and beginning to settle, and must be taken down and rebuilt. One of the piers was considerably injured by the July flood, and will require to be secured by sinking a crib at the base of it.

The superstructure is becoming rotten and defective, and must be replaced with a new one. This aqueduct is very high, and consequently the amount of masonry in the abutments is large. The cost of these repairs amounts to

14,760 00

CANAL FROM HEAD OF FEEDER TO CONEAUT LAKE,
TWENTY-ONE MILES IN LENGTH.

This will require a good deal of alteration: in many places to be straightened, the bottom to be taken out, slips removed, farm and road bridges to be rebuilt, &c. &c. All these expenses I find will cost about \$2,500 per mile, including the waste-wiers and gates, or for the whole line,

52,500 00

Total cost of repairing feeder,

\$86,403 00

Should the new dam be built, and the feeder extended, &c., this sum would be increased \$8,773, and would and will then amount to

95,181 00

It should be remarked here that the repairs above mentioned need not all be made during the next season. The aqueduct across French creek, with a small expense, may stand two years; and the feeder might be used, and answer the purposes of navigation, with an expenditure of five hundred dollars per mile.— Whenever, however, it shall become a portion of the main line, or the feeder for the main line, these repairs must be made. Deducting these sums then, viz : say on the aqueduct 14,000

On the feeder 42,000

and there would remain to be appropriated next winter,

30,403 00

Or in case the new dam and feeder should be adopted, 39,181 00

Respectfully submitted,

CHARLES T. WHIPPO,

Principal Engineer.

ENGINEER'S OFFICE, New Castle, }
October 31, 1837, }

No. 18.—H. R. 27.

Report of Charles T. Whippo, Engineer, upon She-nango line, Erie extension.

MOSES SULLIVAN, Esq.

President of the Board of Canal Commissioners.

SIR—I herewith transmit to you my annual report, in relation to that portion of the Erie extension of the Pennsylvania canal now under contract.

For a general description of the line, I refer you to my report of last year.

The whole line is forty-five and a half miles in length, of which eight and one-third are slackwater and the residue, thirty-seven and one-sixth miles, canal.

The past season has been one of uncommon difficulties for carrying on the operations of constructing a canal. Labour and all kinds of provisions, have been scarce and high, and what has been equally bad, if not worse, is, the weather has been unusually rainy, which has rendered the roads a great part of the time, nearly impassable; thus operating seriously against those who had stone and other materials to haul, and generally, preventing contractors from prosecuting their work with that spirit and effect, which they otherwise would have done, in a more favorable season.

Another thing which has tended to retard the work, is, that many of the contracts, were at first, let at prices lower than they could be done for—thus making it necessary to re-let them; in fact some of the contracts have been re-let several times, which not only caused great delay, but discouraged many, who would otherwise have prosecuted their work vigorously. We have however done as much, as under the circumstances, could have been expected.

The grubbing upon the whole line, is very nearly done.

Section No. 1, has been let and re-let. About one-third of the excavation and embankment is done.

Section No. 2, remains in the hands of the original contractors, and and about one-fifth part of the work has been completed.

Section No. 3, is in the hands of second contractors. It is about one-fourth completed.

Section No. 4, the work on this section has been prosecuted by the original contractors and is now half completed.

Section No. 5, has been re-let—not more than one-sixth or one-seventh part of the whole work has been completed.

- Section No. 6, is in the hands of the original contractor. It has been prosecuted with energy and is now half completed.
- Section No. 7, has been re-let, and the work is from one fifth to one-sixth completed.
- Section No. 8, is about one-third completed by the original contractors.
- Section No. 9, is about one half done by the original contractors.
- Section No. 10, is now in the hands of second contractors. The work is about one-sixth done. This section is heavy and will cost about \$16,000.
- Section No. 11, is in the hands of the original contractor, and is more than half completed.
- Section No. 12, is in the hands of a second contractor, and is one-third done.
- Section No. 13, is in the hands of the original contractors, and is about one-fourth completed.
- Section No. 14, has been re-let once, and is now about one-third done.
- Section No. 15, remains in the hands of the original contractors, and is about one-third done.
- Section No. 16, is retained by the original contractors, and is about one-half completed.
- Section No. 17, is in the hands of second contractors, who have it about one half finished.
- Section No. 18, is in the hands of the original contractor, and is about one-half finished.
- Section No. 19, is in the hands of original contractors, and about one seventh done.
- Section No. 20, has been re-let once, and is now about one-fifth completed.
- Section No. 21, Has been re-let, and is one-seventh completed.
- Section No. 22, has been once re-let—nothing but the grubbing is done.
- Section No. 23, is in the same situation as No. 22.
- Section No. 24, is in the hands of second contractors, who have as yet, done but little upon it.
- Section No. 25, is in the hands of the original contractor, and is about one-sixth completed.
- Section No. 26, has been re-let once and is now two-thirds finished.
- Section No. 27, has also been re-let. It is nearly one-fifth done.
- Section No. 28, is in the hands of the original contractors, and is something more than half done.
- Section No. 29, has been abandoned and re-let recently. It is about one-fourth completed.
- Section No. 30, is in the hands of the original contractor, is three-fourths done, and may be completed in three months.
- Section No. 31, is in the hands of the original contractors, and is nearly half completed.
- Section No. 32, has been abandoned and re-let recently. Little more than the grubbing has been done upon it.

Section No. 33, is in the hands of the original contractors, and is one-third done.

Section No. 34, is in the hands of original contractors, and three-fourths done.

Section No. 35, is in the hands of original contractors, and one-third done.

Section No. 36, is in the hands of second contractors, little more than the grubbing is done.

Section No. 37, is in the hands of the original contractor, and one-third done.

Section No. 38, is in the hands of the original contractors, and will be completed in about one month.

Section No. 39, has been re-let, and is about one third done.

Section No. 40, is in the hands of original contractors. It will be completed in about two months.

Section No. 41, is in the hands of a second contractor, but little has been done upon it.

Section No. 42, is in the hands of the original contractor, and is about two-thirds done.

Section No. 43, is in the hands of the original contractors also, and is two-thirds done.

Section No. 44, is in the hands of second contractors, and two-thirds completed.

Section No. 45, is finished.

Section No. 46, is in the hands of the original contractors, and about one-half done.

Section No. 47, is about one-third done.

Lock No. 1, is nearly completed. The gates are yet to hang and the floor to lay—it will be finished in about one month. The workmanship is unexceptionable and the contractors, Messrs. Foreman and Mitchell, deserve much credit for their honesty and perseverance.

Lock No. 2, has had scarcely any thing done upon it.

Lock No. 3, has been abandoned and re-let. The materials for the foundation and some stone have been delivered, and the pit excavated.

Lock No. 4, has been re-let once. The pit is excavated and the materials for the foundation delivered, and some few stone delivered and cut.

Lock No. 5, has been abandoned and re-let. The pit is dug and the timber for the foundation delivered.

Lock No. 6, is in about the same situation as No. 5.

Lock No. 7, has been once re-let. The foundation is laid and a considerable quantity of stone delivered.

Lock No. 8, has been abandoned, part of the foundation is laid and and the materials for the residue delivered. Some stone have also been delivered, and part of them have been cut.

Lock No. 9, has been abandoned. The pit is dug and a part of the timber, plank and stone delivered, and about one hundred perches of stone cut.

- Lock No. 10, has also been abandoned. Some timber and stone have been delivered.
- Lock No. 11, has once been re-let. The timber for the foundation and a small part of the stone have been delivered.
- Lock No. 12, has recently been abandoned. The greater part of the materials for the foundation, and about one-third of the stone have been delivered, and near two hundred perches of stone cut: the pit is also excavated.
- Lock No. 13, has been re-let. The pit is excavated only.
- Lock No. 14, has been re-let. Part of the materials for the foundation, the iron and about six hundred perches of stone have been delivered, and upwards of two hundred perches of stone cut.
- Lock No. 15, has been re-let. Some timber has been delivered and some excavation done.
- Lock No. 16, is in the hands of the original contractors. The foundation and one course of masonry have been laid, and the iron and the greater part of all the stone delivered.
- Lock No. 17, has had nothing whatever done upon it.
- Lock No. 18, has been re-let once. The foundation and lower course of masonry have been laid and about one-fourth of the stone delivered.
- Lock No. 19, the timber for the foundation and a few stone have been delivered. It has also been re-let.
- Lock No. 20, is in the same situation as No. 19.
- Locks No: 21 and 22, at Greenville have been once re-let. The materials for the foundation of No. 21, and some stone have been delivered, and the foundation of No. 22, and a part of the lower course of masonry have been laid, and the irons and a considerable quantity of stone delivered.
- Lock No. 23, has a part of the materials for the foundation, and about one-fourth of the stone delivered. It has been abandoned.
- Lock No. 24, has been re-let once. The foundation is laid, and near one-third of the stone cut. The iron is also delivered.
- Lock No. 25, has been re-let. The pit is excavated, and the foundation will be laid this fall. About 500 perches of stone, and the irons are delivered, and about 300 perches of stone cut.
- Lock No. 26, has been abandoned and re-let also. The materials for the foundation, and a considerable quantity of stone have been delivered. The pit is also excavated, and part of the foundation laid down.
- Dam No. 1, has been once re-let. A small quantity of materials have been delivered.
- Dam No. 2, is retained by the original contractors. All the timber and iron have been delivered.
- Dam No. 3, is in the hands of the original contractors. Nearly all the materials have been delivered.

Dam No. 4, has been once re-let. All the materials have been delivered, and one abutment partly built. About two-thirds of the dam will be completed this fall.

Dam No. 5, is in the hands of the original contractors. All the materials have been delivered, and one abutment built, and part of the stone for the other delivered.

Aqueduct No. 1, has been once re-let. Some timber and a considerable quantity of stone have been delivered.

Aqueduct No. 2, has been re-let. A good portion of the materials have been delivered, and the foundation partly excavated.

Aqueduct No. 3, is in about the same situation as No. 2.

But little has yet been done to any waste weirs, towing path bridges, and none of the road or farm bridges have been put under contract.

Below I have given a revised estimate of the line, predicated upon present contract prices, where we thought them high enough, and in other cases upon our own judgment of the cost, taking into consideration the prices of labor, provisions, &c. This estimate it will be seen, is about eighteen per cent. above that of last year; and although this is not probably equal to the difference in the times, yet I think it will be amply sufficient, unless the times should become still more unfavorable.

This increase in the prices of provisions, &c., together with the almost unprecedented bad season for carrying on work, has operated very seriously upon some of the contractors, and particularly those engaged upon mechanical work. Many of them have been obliged to abandon their jobs, after sacrificing much labor and money upon them. Many of these jobs are now in the hands of contractors, who I am in hopes will be enabled to complete them at their present prices.

ESTIMATE.

Sections	\$380,453 52
Locks	328,937 03
Dams	57,196 33
Aqueducts	24,488 34
Towing path bridges	8,421 61
Waste-weirs	20,062 98
Road bridges	15,121 50
Farm bridges	42,849 00
Lock houses	14,400 00
Fence	6,000 00
	<hr/>
	\$897,930 31
Add for superintendence and contingencies ten per cent.	89,793 03
	<hr/>
Total Cost	<u>\$987,723,34</u>

In a letter which I received a few days since from Mr. Penny-packer, your secretary, he says: "The board wish you to give your opinion as to the extent to which it would be practicable and proper, to carry on operations next year." This depends very much upon the system which is to be pursued. The sections of a canal, where there is nothing more than the ordinary excavation and embankment to be done, can be constructed in about six months; and these together with many similar jobs might safely be omitted, till within about that period of the completion of the other work; and then they should be divided into short sections, and a competent force applied. The heavy jobs only should at first be put under contract, and all the force which could be raised concentrated upon them. This would have a tendency to reduce the price of labor by lessening competition, and the consequence would be, that the heavy jobs would be much sooner finished, and at less cost, than if the whole line were under contract at once. Another advantage to be derived by this course, would be the saving of the interest of the money on the cost of these light sections and jobs, from the time of their completion, till the completion of the large jobs; and as during this period the banks of the canal would be washed considerably by the rains, the bottom filled up, &c., &c., large sums for repairs would be saved. If you will examine our sections on this line, which are a mile in length, you will perceive in a majority of cases, that if they were divided into two parts they would make light jobs, amounting to little more than \$4000 each, which could certainly be completed in the time I have mentioned. My opinion therefore is that all the heavy jobs from the upper end of this line to Erie, should be put under contract next year; and it might be well to put the whole of the line, from the end of this to Coneaut Lake under contract, and have it completed if possible, at the same time this will be.— This would form a connexion with the French creek improvements and bring in the trade of that valley; and should the French creek canal be repaired, a very considerable amount from Franklin, and from the country above on the Allegheny river. At this time, neither the French creek canal nor feeder are of any utility to the country through which they pass, and much less to the Commonwealth. In fact they have I believe, been a burthen to both. But by the plan I propose, they might both answer a valuable purpose. The valley of French creek is extensive and fertile, and would send through these two avenues into the Shenango and Beaver divisions, a large amount of trade which would add materially to the toils, and accommodate an extensive district of country.

This line ought by all means to be finished by next fall; and I have no doubt will be, should a sufficient sum of money be appropriated for that purpose.

Respectfully submitted,

CHARLES T. WHIPPO,

Principal Engineer.

ENGINEER'S OFFICE, New Castle, }
October 31, 1837.

No. 19—H. R. 28.

Report of James D. Harris, Engineer, Penn's Creek.

To the Board of Canal Commissioners of Pennsylvania.

GENTLEMEN—By a resolution of your board dated May 1, 1837, the undersigned was directed to make a survey of the Penn's creek valley, agreeably to the provisions of the forty-ninth section of an act passed April 1st, 1837. Having completed the duty therein entrusted, I now have the honor to transmit the following report, together with estimates of the cost of the two modes of improvement, contemplated by said section, and a map shewing at one view the several lines upon which estimates have been predicated.

Before entering upon a detail of the field operations, I would respectfully premise that by an act of assembly, dated the 23d February, 1830, a company was authorized to make a canal or slack-water navigation, "from the lock out of the Pennsylvania canal into said (Penn's) creek, to Solomon Kleckner's dam, at New Berlin" in Union county, and by the twenty-fifth section of said act, the Canal Commissioners were required to have a survey and estimate of the cost of the improvement made by one of the engineers in the employ of the State, during the same year, provided it could be done without materially interfering with the duties of such engineer. The survey not having been made in accordance with the act, it was made the duty of the Canal Commissioners by the forty-ninth section of the act of April 1st, 1837, to have the survey and estimate made agreeably to the original intention; and also a survey, and estimate of the cost of a rail road between the same points.

The duty of making the survey having devolved on the undersigned by the resolution of the board of Canal Commissioners before referred to, the performance of it was commenced on the 25th September last, at the village of New Berlin.

SURVEY OF THE CANAL ROUTE.

The survey of the route for a canal was first made. The line was traced with a view to the construction of a canal twenty feet wide at bottom, and four feet depth of water. These were assumed as the *minimum* dimensions, but in all cases when the natural shape of the ground admits of widening the canal beyond the *minimum* breadth, without much increase of cost, it is proposed to enlarge it to twenty-eight feet width at bottom, (the width of the Pennsylvania canal) or wider.

The stations were fixed at six chains distance from each other.—The line begins at the public bridge over the pool of Solomon Kleckner's dam, in New Berlin, at the point where Vine street intersects Penn's creek. The pool of the dam from this place to the mill, a distance of 1200 feet, is sufficiently deep, and wide to form a conve-

nient basin for canal boats, it being only necessary to expend a small sum in shaping it to suit the business of storing and forwarding expected to be done upon it. There will be no necessity for raising the dam higher than it now is for this purpose.

At the mill it is proposed to place a guard lock, to be connected with the mill wall, in a substantial manner. The canal may be carried past the mill in such manner, as to give every facility for transferring freight to, and from the canal boats, without impairing the permanency of the building, whilst this will probably be found to be the cheapest and most permanent mode of construction.

From Kleckner's mill the line passes through the flats to Fisher's clover mill, near station ten. Here a lock, of five feet fall, is proposed to pass the boats into the pool of Fisher's dam, by means of which the stream will be crossed. A new dam will have to be built here of four feet in height, which will raise the water six inches higher than at present. At Fisher's mill a guard lock will be required.

From this place to Mowrer's mill (station thirty-six) the canal will pursue the south-west side of the creek, through flats, and favorable ground for a canal. Mowrer's head race will be passed by a culvert with a wooden trunk, twenty feet wide in the clear, between the abutments. At the mill a lock will be required of eight feet fall communicating with the pool of a dam four feet in height, proposed to be built opposite the mill, by which the creek will be crossed to the north-east side.

After crossing the creek a guard lock will be required at the head of a flat, along which the canal will pass over favorable ground for half a mile, to station forty-three, and will pursue the same side of the creek to the ford below Ritters' (station ninety-nine.) The ground for the greater portion of the distance, between stations forty-three and ninety-nine, is favorable. At a few points the canal will be crowded into the creek, at the bluffs, occasioning some rock excavation, and requiring protection wall. At station fifty-three, below Miller's, a lock of seven feet fall will be required, and at station eighty-two, below Fisher's, a lock of eight feet fall is proposed. At station ninety-eight, a lock of eight feet fall will be required, by which the boats will be passed into the pool of a dam proposed to be erected at the ford below Ritters'. A culvert (twenty feet span) of timber, will be necessary at Ritter's saw mill, to pass the mill stream. The dam at the ford will be four feet in height. At the south-west side of the creek a guard lock will be required.

From station ninety-nine to station one hundred and twenty-five, (Richter's mill) the canal will pursue the south-west side of the creek, on favorable ground. At station one hundred and nineteen, a lock of six feet fall will be required, and at station one hundred and twenty-four, another of six feet fall will be necessary, by which the level will be depressed to suit the level of the pool of Richter's dam. A new dam will be required here four and a half feet in height.

By means of this pool the creek will be crossed to the north-east side, along which the line is traced to station one hundred and fifty, near the bridge across Penn's creek, above Selins' Grove. At station

one hundred and twenty-five, a guard lock will be required, immediately above Richter's mill. At station one hundred and fifty, two locks will be necessary with the aggregate fall of fifteen feet, by which the boats will be passed into the pool of Eccle's dam, which will afford a good depth of water for boats, thence to the lock communicating with the Pennsylvania canal, at station one hundred and fifty-seven.

The whole distance from the place of beginning at New Berlin, to the Pennsylvania canal by this route, is eleven miles and fifty-one chains. The lockage from the pool of Kleckner's dam, to the pool of Eccle's dam, is sixty-three feet, which is proposed to be overcome by means of nine locks. There will be five guard locks in addition. The estimate of the cost of this route, is as follows:

16 chains,	grubbing,	at \$6 00	\$96 00
262 "	"	7 00	1,834 00
150,808 cubic yards, excavation,		12	18,096 96
46,543 "	"	15	6,981 45
95,184 "	embankment,	14	13,325 76
4,147 "	rock,	45	1,066 15
13,230 perches,	wall,	1 00	13,230 00
660 "	rip-rap,	35	231 00
Towing path at pools,			2,240 00
1 guard lock,			\$5,500 00
4 do:	at \$5,000 00		20,000 00
1 lift lock, 5 feet,			3,000 00
2 do. 6 "	3,600 00		7,200 00
2 do. 7 "	4,200 00		8,400 00
4 do. 8 "	4,800 00		19,200 00
			<hr/> 63,300 00
1 dam at Kleckner's mill,			\$2,500 00
1 do. at Fisher's mill,			5,000 00
1 do. at Mowrer's mill,			5,000 00
1 do. at Ritter's,			5,000 00
1 do. at Richter's mill			6,000 00
			<hr/> 23,500 00
1 culvert at Mowrer's mill,			800 00
1 do. at Ritters'			1,200 00
			<hr/> 2,000 00
8 waste weirs,	at \$300 00		4,000 00
3 water ways,	500 00		1,500 00
22 bridges,	500 00		11,000 00
4,920 perches fence,	75		3,690 00
75 chains, removing road,			500 00
Removing buildings,			400 00
			<hr/> \$167,791 32
Add 10 per cent. for contingencies,			16,779 13
11 miles 51.80,	Total		<hr/> \$184,560 45

As the public interest appeared to require that the nearest and best route should be ascertained, by which a junction could be formed with the Pennsylvania canal, a line was run from Richter's mill pond, through a depression in the high land, between the creek and the canal, and by persuing the most favorable ground, it was found that a connexion would be formed with the Pennsylvania canal at a point sixty-eight chains, or more than three quarters of a mile above the lock connecting the creek with the canal. The whole length of this route is ten miles and seventy-seven chains, or three chains less than eleven miles. The lockage from the pool of Kleckner's dam to the Pennsylvania canal is fifty-nine feet, which is divided among eight locks. The number of guard locks would be the same as on the route terminating in Mr. Eccle's mill pond. The estimate of the cost of this route is as follows :

6 chains,	grubbing,	at \$6 00	\$36 00
286 "	do.	7 00	2,002 00
150,808 cubic yards,	excavation,	12	18,096 96
37,614 "	do.	15	5,642 10
74,764 "	embankment,	14	10,466 96
4,147 "	rock,	45	1,866 15
13,230 perches,	wall,	1 00	13,230 00
660 "	rip-rap,	35	231 00
Towing path at pools,			40 00
1 guard lock		\$5,500 00	
4 do.	at \$5,000 00	20,000 00	
1 lift lock, 5 feet,		3,000 00	
2 do. 6 "	3,600 00	7,200 00	
1 do. 7 "		4,200 00	
3 do. 8 "	4,800 00	14,400 00	
1 do. 11 "		6,600 00	
			60,900 00
Dams, as per last statement,			23,500 00
Culverts, do.			2,000 00
Waste-weirs, do.			4,000 00
Water ways, do.			1,500 00
Bridges, do.			11,000 00
Fence do.			3,690 00
Removing buildings, do.			400 00
do. road, do.			500 00
			<hr/>
			\$159,101 17
Add 10 per cent. for contingencies,			15,910 11
			<hr/>
10 miles 77-80,	Total,		\$175,011 28
			<hr/>

There will be no formidable obstacle in the way of the construction of the canal upon either of the routes above described. It should not be concealed, however, that the adoption of the former will have the effect of *drawing water from the Pennsylvania canal*, for the

supply of the lock between it and the pool of Eccles' dam, with a lift of 4.77 feet, whilst an *accession* of water to the Pennsylvania canal would be gained by the adoption of the latter.

A third line was run with a view to the connection with the Pennsylvania canal, by deflecting from the first described route, near the bridge over Penn's creek, and meeting the Pennsylvania canal at the distance of thirty-six chains north of the outlet lock, referred to in the act of assembly. The conditions under which the connection would be formed here, would be similar to those of the second described route. There would be an *augmentation* in the supply of water for the Pennsylvania canal, and the connection would approximate more nearly to a literal fulfillment of the law, it being thirty-two chains nearer the outlet lock, than that which would be formed by the second described route. The whole length of the line connecting here would be eleven miles and twenty-five chains. The whole lockage would be fifty-nine feet, which would be overcome by eight locks. There would be five guard locks, as on both the other routes. The estimate of the cost of this route is as follows :

16 chains,	grubbing,	at \$6 00	\$96 00
262 "	do.	7 00	1,834 00
150,808 cubic yards,	excavation,	12	18,096 96
42,543 "	do.	15	6,381 40
98,270 "	embankment,	14	13,757 80
4,147 "	rock,	45	1,866 15
13,230 "	wall,	1 00	13,230 00
660 perches,	rip-rap,	35	231 00
Towing path along pools,			40 00
Locks, as per last statement,			60,900 00
Dams,	do.		23,500 00
Culverts,	do.		2,000 00
Waste-weirs	do.		4,000 00
Water-ways,	do.		1,500 00
Bridges,	do.		11,000 00
Fence,	do.		3,690 00
Removing buildings,	do.		400 00
do. road,	do.		500 00
			<hr/>
Add 10 per cent. for contingencies,			\$163,023 31
			16,302 33
11 miles 25-80			<hr/>
Total,			\$179,325 64
			<hr/>

The locks upon each of the routes are estimated on the supposition that they will be of the same size with the locks of the Pennsylvania canal, viz: seventeen by ninety feet in the chamber, and built of stone laid without mortar, but the walls to be substantially bound by means of good stone, and faced with plank in the chamber which will be secured to studs built into the walls.

The dams are proposed to be built of timber, put together in the form of cribs, filled with stone, and planked and gravelled. They

will each be furnished with a schute to pass the descending craft safely. None will exceed four and a half feet in height.

The bridges are proposed to be built of timber chiefly, in a substantial manner. The estimated cost is intended to cover the expense of the embankments.

The damage which may be done to water privileges, already improved, by the adoption of either of the three plans proposed for connecting with the Pennsylvania canal, will be trifling. The dam proposed to be built at Mowrer's mill would lessen the fall at Dale's mill, half a mile above, by setting back the water in the tail race, to the depth of four tenths of a foot, and would reduce his fall from 2.70 to 2.30 feet. This damage would be attendant on all of the three plans. It may be remarked, that this damage can be avoided by deepening the channel of the creek at the dam at Mowrer's. The objection to this would be its liability to be filled with sand, at times of freshets, and thereby presenting an obstruction to the passage of boats.

No other damage would be done to the water powers on the creek, except what might be occasioned by taking out the water of the stream above a mill, and returning it below. This would amount to little more than the loss of lockage water, and would be more than compensated by the increased facilities which would be afforded by the canal, for carrying to market the flour and other manufactured articles produced at the mills. If there would be an exception it would be in the case of Mr. Eccle's mill, which is already as fully accommodated by the canal as it could be by any of the routes, except the first described which terminates in the pool of his dam.

SURVEY OF THE ROUTE FOR A RAIL ROAD.

Having completed the survey of the route for a canal, agreeably to your instructions, my attention was then directed to the survey of a route for a rail road between the same points.

Presuming that such scope was intended to be given in the act of Assembly, as would justify the termination of the rail road *near* the points named, upon such principles as would render the improvement of the greatest value when completed, a point was taken in the village of New Berlin, at the intersection of Vine and Water-streets, from which the line pursues the centre of Water street on a level for three hundred and ninety-six feet: at the termination of this distance a descending grade commences, which continues for forty-eight chains to station nine. Thence to station twelve the line is level, crossing Penn's creek at Fisher's mill (station eleven.) From station twelve to Mowrer's mill, (station thirty-five) the ground is favorable.

At station thirty-five the line crosses the creek to the north-east side, which side is pursued to the Pennsylvania canal. In following the route from Mowrer's mill to the place of termination, the line is traced near the creek, over flats generally, but occasionally by narrows to the neighborhood of Richter's mill, where it diverges from the bank of the creek, and passes over the high flat land near Mr.

App's, until it meets the Pennsylvania canal, at a point favorable for the transshipment of freight, thirty-six chains north of the oulet lock, connecting with Penn's creek.

The whole length of the rail road will be ten and a half miles.

No expensive bridges will be required on this route, except at Fisher's mill, and Mowrer's mill, where the road crosses the creek. The bridge at each place will be about two hundred feet long. A bridge will be required over Mowrer's mill race of twenty feet span, one at Ritter's saw mill, one at station ninety-six, and one at station one hundred and six, of ten feet span each. Nine square culverts of stone will be required, from two to four feet span. At the points where the road will pass the narrows, a wall will be necessary to protect the road against the freshets of the creek.

By inspecting the following table of grades, it will be seen that the plane of the road will be either *level* or *descending*, from the place of beginning, at New Berlin, until it meets the Pennsylvania canal at the place of termination; that the *highest* grade is fifty feet to the mile, and that it seldom exceeds twelve feet to the mile.

TABLE OF GRADES.

From No.	To No.	Decent grade per mile.	Decent from N. Berlin.	Distance from N. Berlin.	Remarks.
	1			6 chains	Level
1	8	50.00 feet	26.00	48 "	
8	12			72 "	Level
12	17	5.33	23.00	102 "	
17	31	7.62	36.00	186 "	
31	35			210 "	Level
35	42	5.71	39.00	252 "	
42	46			276 "	Level
46	51	32.00	51.00	306 "	
51	63	3.33	54.00	338 "	
63	72			432 "	Level
72	79	11.43	60.00	474 "	
79	91			546 "	Level
91	99	10.00	66.00	594 "	
99	121			726 "	Level
121	132	10.90	75.00	792 "	
132	138	24.44	86.00	828 "	
138	140			840 "	Level

The *greatest* curvature on the road, as will be perceived by examining the following table of curves, is five hundred and ninety-four feet radius, and it seldom exceeds fifteen hundred feet. The length of the curved portion of the road may appear great, in proportion to the whole length of the road, but is necessarily so on account of the contracted dimensions of the valley. On a revision of the line, much improvement would no doubt be made in this particular.

TABLE OF CURVES.

No. of curve.	Station at apex.	length of curve.	radius in feet.
1	3½	20 ch.	5,576
2	9	12	2,396
3	13	12	4,112
4	25	20	1,314
5	40½	18	2,500
6	42½	18	594
7	48	12	4,635
8	52½	12	1,750
9	57	12	4,000
10	62½	18	988
11	65	12	6,236
12	67	12	5,457
13	70 2-3	16	748
14	76 5-12	20	1,352
15	80	6	642
16	81½	12	2,740
17	84	12	5,166
18	88½	42	8,867
19	93	10	9,450
20	95 2-3	12	1,543
21	99 2-3	10	2,200
22	103¾	39	11,000
23	108	12	2,463
24	111 1-6	12	1,863
25	114½	16	1,510
26	117	12	1,946
27	128	20	3,698
28	138	10	2,111

An estimate has been made of the cost of a rail road, with both a double and a single track. The following is an estimate of the cost of a road, prepared to receive the rails for a *single track*:

219 chains,	grubbing,	at \$6 00	\$1,314 00
52,218 cubic yards,	excavation,	12	6,266 16
9,370 "	rock,	45	4,216 50
67,042 "	embankment,	14	9,385 88
14,193 perches,	wall,	1 00	14,193 00
235 "	culverts,	2 00	470 00
2 bridges over creek,		5,000 00	10,000 00
1 " Mowrer's head race,			620 00
1 " Ritter's saw-mill,			460 00
1 " Station 96,			460 00
1 " " 106,			460 00

Road formation, (single track,)

\$47,845 54

The estimate of the cost of a road prepared to receive the rails for a *double track*, is as follows:

219 chains grubbing,	\$7 00	\$1,533 00
9,159 cubic yards, excavation,	12	8,299 08
9,370 " rock,	45	4,216 50
99,438 " embankment,	14	13,921 32
14,193 perches, wall,	1 00	14,193 00
297 " culverts,	2 00	594 00
2 bridges over creek,	5,000 00	10,000 00
1 " Mowrer's race,		620 00
1 " Ritter's saw-mill,		460 00
1 " Station 96,		460 00
1 " " 106,		460 00

Road formation, (double track,)	<u>\$54,756 90</u>
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Estimate of the cost of the superstructure for one mile of *single track*.

26 tons iron, (rails and spikes)	\$80 00	\$2,080 00
1,760 cross ties, 10 by 10 inches,	40	704 00
10,560 lineal feet rails, 6 by 9 inches,	5	528 00
880 cubic yards broken stone,	1 00	880 00
Laying rails,		1,280 00

Amount,	<u>\$5,472 00</u>
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Cost of one mile, (single track,)	\$5,472 00
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Length of road, including half a mile of turn-outs and parallel roads,

11 m,

Turn-out plates and switches, at two turn-outs,	\$60,192 00
22 crossings for public and farm roads, at \$30,	2,000 00
2 turn-about, at \$200,	660 00
	400 00

\$63,252 00

Road formation brought forward,	47,845 54
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\$111,097 54

Add 10 per cent. for contingencies,	11,109 75
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Estimated cost of road, (single track)	<u>\$122,207 29</u>
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Estimate of the cost of the superstructure for one mile *double track*.

52 tons iron, (rails and spikes,)	\$80 00	\$4,160 00
3,520 cross ties, 10 by 10 inches,	40	1,408 00
21,120 lineal feet, rails, 6 by 9 inches,	5	1,056 00
1,760 cubic yards broken stone,	1 00	1,760 00
Laying rails,		2,560 00

Amount,	<u>\$10,944 00</u>
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Cost of one mile, (double track,)	\$14,944 00
Length of road, including one-fourth mile for crossings and parallel roads,	15 $\frac{3}{4}$ m.
	<hr/>
	\$117,648 00
Turn-out plates and switches, at two crossings,	2,000 00
22 crossings for public and farm roads, at \$40,	880 00
2 turn-abouts, at \$200,	400 00
	<hr/>
	\$120,928 00
Road formation brought forward,	54,756 90
	<hr/>
	\$175,684 90
Add 10 per cent. for contingencies,	17,568 49
	<hr/>
Estimated cost of road, (double track,)	\$193,253 39
	<hr/>

The foregoing estimates for a rail road are made for a work of the most permanent character, which can be constructed with wooden rails and cross ties. The iron for the rails is proposed to be three-fourths of an inch by two inches. A much *cheaper* road may be built at a sacrifice of *permanency*. The propriety of *cheapening* it would depend on the resources of the company who might construct it. All experience teaches the sound economy of doing a work permanently, where the means can be procured.

Before closing this report, it will perhaps be expected that an opinion will be advanced, touching the comparative merits of the two modes of conveyance in the case now under consideration.

It appears to be now settled that a canal is preferable to a rail road for the transportation of all articles of freight, which are heavy and cumbersome in proportion to their value, as being the cheapest mode of conveyance, where the cost of the canal does not greatly exceed the cost of the rail road. In the trade and intercourse between large commercial and manufacturing places, where the articles of freight are very valuable in proportion to their weight and bulk, such as silk goods, the public mail, &c., or where the lading will consist for the most part of passengers, *despatch* is of the utmost importance, but in the transportation of most articles of trade, it is less important than *cheapness*. It is only necessary, then, to enquire what is the nature of the freight which is destined to be carried on this improvement, in order to determine the question.

The chief articles of transportation southward, will be the products of the valleys of Union county and part of Centre county, consisting of flour, wheat, rye, corn, barley, cloverseed, flaxseed, pork, bacon, lard and butter. The leading articles which may be carried in the opposite direction, will be coal, plaster and merchandize. The articles which will pass in both directions may principally be termed cumbersome and heavy in proportion to their value, and are such as will render either of modes of transportation profitable, as the country becomes improved, but will be carried, as is believed, more advan-

tagiously on a canal than on a rail road. The *extra* transshipment which would be the cause of some loss and expense, independent of that which would be occasioned by the mere handling of the barrels and boxes, is another objection to the rail road in this case. All the reasons, however, which have been adduced in favor of the one and against the other, might lose much of their weight, if the rail road contemplated, should form only a link in a chain of road, connecting distant parts of the country. With these remarks, therefore, I leave the decision of the question for those whose province it may be to act upon it.

Respectfully submitted,

JAMES D. HARRIS,

Engineer.

TOWANDA, November 10, 1837.

No. 20—H. R. 29.

Report of John P. Bailey, Engineer, survey of West Philadelphia rail road.

PHILADELPHIA, Nov. 28, 1837.

To the Board of Canal Commissioners,

GENTLEMEN—Respecting the West Philadelphia rail road, the board is furnished with the following information, in conformity with a resolution directing a survey of said road “with a view of ascertaining satisfactorily its length, grades, practicability of connecting it with the state rail road at the foot of the inclined plane, and the cost of completing said road, so as to make it a part of the state rail way.”

Length of the road from its intersection with the Columbia road, to the west end of the permanent bridge at Market street, seven miles one hundred and sixty-eight perches.

GRADES, (BEGINNING AT THE INTERSECTION.)

Distance in four pole chains	Descent per mile in feet.	Remarks.
80 chains	44.76 feet	The first descent of 52 feet per mile ends within 10 chains of the turnpike at the first crossing above the file factory.
96	44	
101	52	
22	48	
17	52	
19	52.64	The grade of 56.8 per mile, begins a little above the second crossing of the turnpike below the file factory, and ends near Hestonville, or a little below the old Columbus tavern.
59.30	56.80	
62	Level	
54	48	
77	52	
15	Level	
602 whole length.	322½ ft. whole fall.	

The board will perceive, by the remarks attached to the table of grades, that the heavy grade of 56.8 feet per mile ends near the Columbus tavern, marked on the map. It would not be worth while to diverge from the line further back than at this point, in order to connect with the state rail road at the foot of the inclined plane, as nothing of any account can be gained towards relieving the grade, or distance be materially diminished. Distance from Hestonville to the west end of Belmont bridge at the foot of the inclined plane, eighty-

nine chains. Fall in that distance to the top of the square of the bridge, or to the eaves of the roof, 49.6 feet. A connection may therefore be made with the present state road at the foot of the inclined plane, by carrying the rail way over the top of the Belmont bridge; with grades less than the highest grades of the West Philadelphia road, as appears above. The branch will come into a line with the bridge on a curve of six hundred and thirty-one feet radius. It appears by the table of curves annexed marked C. that the sum of the curves having this radius of curvature, between Philadelphia and Coatesville on the present state road, is eighty-two chains, or rather more than a mile.

The present road at the east end of Belmont bridge and including the bridge is level for one hundred and three chains, from the table of grades annexed marked B. From the top of the bridge therefore at the east end of it, the line may reach the level of the present road in one half a mile, at a descent of thirty-two feet per mile, the height of the bridge being about sixteen feet. The ground is favorable for this, and several short curves in the present road will be avoided by it, which will more than compensate for the short one of about nine chains in length which will be added at the west end of the bridge on a grade of twenty feet to the mile. The line can be made to pass over the top of Belmont bridge without difficulty, which will secure it from the danger of fire, and leave it stronger than it is at present with the road passing through it.

Length of road from the Belmont bridge by way of the connecting branch and West Philadelphia road to the intersection west of the eight mile post on the present state road, six miles ten chains.

From the west end of Belmont bridge by way of the state road to the intersection, five miles forty-eight chains.

Difference forty-two chains, or over one-half mile increased.

Estimate of the cost of finishing the grading of the W. P. R. R.

140,000 cubic yards embankment,	at 18c	\$25,000 00
31,000 " " common excavation,	10	3,100 00
6,200 " " rock,	30	1,860 00
2,600 perches masonry,	\$2 50	6,500 00
		<hr/>
		\$36,460 00
		<hr/>

Estimate of grading the branch to Belmont bridge and beyond.

54,400 cubic yards embankment,	at 10c	\$5,440 00
118,400 " " excavation,	20	23,680 00
1,200 perches masonry	\$2 50	2,800 00
60,000 feet of scantling for the bridge,	\$10 00	600 00
Workmanship altering bridge,		1,000 00
		<hr/>
		\$33,520 00
		<hr/>

Whole length of new road to be made including the branch to Belmont, and the part east of the bridge to be graded, nine miles eleven chains.

Length of old road to be abandoned, six miles eight chains.

Difference, three miles three chains; which will require new rails to be furnished only, chargeable exclusively to the new road. For the north track of the old road will require renewing should it remain in operation, and is estimated for in the expenses reported for that road the next year; and is chargeable to the old road, should the cost of renewing it be applied in the construction of the new instead. And the materials of the south track of the part of the old road to be abandoned, or six miles eight chains being good, the expense only of transferring and re-setting them is chargeable to the new road. There remains, therefore, three miles three chains double track of new materials to be furnished, which are to be charged to the construction of the new road. But as the main route of the West Philadelphia rail road, entering direct into Market-street, will accommodate business, coming as it does into the midst of it, as well and better than the Columbia road now does, entering the northern parts of the city, the cost of constructing the West Philadelphia rail road alone, therefore, should be set down as the actual cost of avoiding the plane; the branch to Belmont being an extra cost, to give greater facilities to trade: and the whole road from Belmont bridge to Callowhill-street, may be considered as clear gain to the Commonwealth, whether to be taken up and used elsewhere, or kept in operation by connecting at Hestonville, by means of the Belmont branch.

Length of the West Philadelphia road seven miles forty-two chains—old road to be abandoned from Belmont bridge to the intersection, five miles and forty-eight chains. Difference one mile, seventy-four chains. Requiring only one mile seventy-four chains of new materials to be furnished for the West Philadelphia road alone.

Estimated cost of the Superstructure for the west Philadelphia rail road alone, viz:

5 miles 48 ch. or 1,792 rods, old road to be removed		
and re-set,	at \$9	\$16,128 00
1 mile 74 ch. or 1.02 mile of new road as per former reports,	at \$19,500	37,440 00
		<hr/>
		\$ 53,568 00

Length of the branch from Hestonville to the west end of Belmont bridge, eighty-nine chains.

Length of old road to be taken up and re-set east of the bridge, forty chains.

Estimate of the cost of Superstructure of the branch.

38 ch. or 1.1 mile of new road as per former reports,	
at \$19,500	\$21,450 00
40 ch. or 160 rods of old road to be taken up and re-	
laid, at \$9 00	1,440 00
Grading of the branch as per estimate,	33,520 00
Total cost of the branch,	<u>\$56,410 00</u>

The money which has already been expended by the West Philadelphia rail road company, as appears by the accompanying statement of the Treasurer, marked A, is \$190,000 00. A pretty heavy sum and the road still unfinished. The grading, however, may be completed in two months. Comparatively a small proportion of it remains unfinished, as seems to be but little known. It was matter of surprize to find it so far advanced. Much heavy work has been done. The line crosses obliquely the streams which run south from the dividing ridge, between the waters of the Delaware and Schuylkill, on which the present State rail way is located, and heavy work was required of masonry as well as excavation and embankment. The masonry stands well, except the culvert below the file factory, which has fallen in and will have to be dug up and rebuilt.

Estimate of the whole cost of the West Phila. rail road alone, viz:

Cost of the work done,	\$190,000 00
Grading to complete the road,	36,460 00
Superstructure,	53,568 00
	<u>\$280,028 00</u>
Add 10 per cent. for contingencies,	28,002 80
Total,	<u>\$308,030 00</u>
Interest on the above sum at 5 per cent.	\$15,401 00
Cost of maintaining the Schuylkill plane and the motive power from its foot to Broad-st. past year,	<u>\$22,500 00</u>

Fifty feet grades have been demonstrated to be preferable to inclined planes. The average grade of the West Philadelphia road is less than fifty to the mile. If not taken by the State, the road will in time be completed by the company, and will exist by abstracting business and tolls from the State road: The board are sensible of the loss to the Commonwealth and the inconvenience of rail ways connecting and running parallel with the State improvements, in the instance of the Harrisburg and Lancaster rail way. The propriety of adopting the West Philadelphia rail road as a means of avoiding the plane seems clearly demonstrated to the board, from the facts which this survey developes. It can be put in operation for a sum the interest of which is as appears above, less than the cost of maintaining the plane by \$7,099 00, which may be applied, as may

be required in maintaining extra locomotives to be employed in assisting trains up the heavy grades. And the Belmont bridge, and the materials of the rail way from it to Broad-street, will be clear gain to the Commonwealth, to remain in use where they are, or be taken up and applied elsewhere as may be deemed best. I would respectfully remark here, that were the main line to the West Philadelphia put in operation, it would accommodate the business for some time to come. It may be found that a line running direct from Hestonville to Broad and Callowhill-streets, crossing the Schuylkill near the upper ferry bridge below Fairmount, can be made with easier grades and shorter distance in all than by way of the branch and Belmont. It has a favorable appearance to the eye, and may be entitled to some attention. The passenger trains will ascend the heavy grades, and go on without interruption, and the possible danger of the plane and the annoyance which half an hours delay on it, occasions to travellers, be avoided. The business of the eastern portion of the road will still be left to the Commonwealth and not abstracted from it by a company road. And the road at the same time will be directed to different parts of the city, giving more general accommodation. The capacity of the Columbia and Philadelphia road, might then be calculated as follows: Allowing trains of thirty cars each, travelling at intervals of ten minutes apart and running night and day: in twenty four hours one hundred and forty four trains would pass each way, freighted with 15,120 tons, allowing $3\frac{1}{2}$ tons freight to a car; and in 365 days, freight past, 5,518,800 tons, each way. At this rate it will be some time before the Columbia road will be unable to pass the business that may come upon it. When the Gettysburg extension shall be completed, and the Sunbury and Erie rail way connected with the western end of the Columbia and Philadelphia road, and a rail way constructed along side the canal to Pittsburg, which is not least amongst them: the canal for heavy freight and the rail way for lighter carriage and for the accommodation of business and travellers when the canal is closed in winter. When these roads shall first be put in operation, now urgently required, and unite on the Columbia road, it may be expedient but not wisely till then, to diverge from it further west in the neighborhood of Downingtown. There will be business enough to retain the present road in operation, and it need never be abandoned. The descent on the heavy grades may be made with safety with long trains, by locking all the breaks with a slight pressure on the wheels, leaving one free for the conductor to apply at pleasure. The West Philadelphia road has all the advantages in power over the plane, that can be gained by diverging from the Columbia road any where between the head of the plane and the intersection of the West Chester road: for the increase of expense in the construction of the road, by increase of distance over a country so broken as that on either side of the Columbia road, would keep more extra locomotives employed on the West Philadelphia rail road, than will ever be required upon it. As engines could not go beyond the western end of the permanent bridge, I would respectfully recommend to the board that the State road stop there, and require the bridge

company to alter the bridge for the accommodation of the rail way, with the privilege of charging tolls; and require the city to extend the rail way from the bridge to Broad-street, and to have them ready by the time the remainder of the road be ready for use. Either can hardly object, as the road will be greatly to the interest of both. Should the West Philadelphia rail road be adopted, all the money asked for, to put the old road in repair will be required to be applied to the new road instead, excepting the cost of roofing the plane. Should the West Philadelphia road not be adopted, I would respectfully recommend to the board, that the machinery of the plane be improved, by lengthening the ends of the rope at the head and foot, to admit of hitching on a full train of passenger cars at a time. It will require a new engine house to be built immediately, west of the present one, and two new double engines, to have one ready for use in case the other is out of order.

Whole cost estimated at \$20,000. The trains could pass the plane in fifteen minutes instead of half an hour as at present. Should the West Philadelphia rail road company ask unreasonably for their road, so that an arrangement cannot be made with them, I would respectfully recommend the construction of a new route entire. For though the plane can be improved so as greatly to increase its capacity, as has been described, yet its avoidance can be accomplished advantageously with grades of fifty feet per mile, as has been demonstrated, and it would be better that it should be done.

All of which is respectfully submitted,

JOHN P. BAILEY,

Engineer.

A.

Cost of the West Philadelphia rail road, as near as can be ascertained at this time, as follows:

Masonry, grading and bridges,	\$150,000 00
Damages, fencing and incidental expences,	40,000 00
	<hr/>
	\$190,000 00
	<hr/>

JOSEPH TRASEL,

Treasurer.

WEST PHILA. R. R. OFFICE, }
November 24th, 1837. }

B.

Table exhibiting the grades of the present Columbia and Philadelphia Rail-way, commencing at the corner of Broad and Callowhill streets, and extending to Coatesville.

	Length of each grade in chains.	Rate per mile.	Amt. of each grade in feet.	Height of road from high tide.	Remarks.
	chs. lks.	asc. desc. level.			Corner of Broad and Callowhill streets, Phila- delphia.
1	9 83			41.201	
2	27 00	10 ft.	3.375	41.201	
3	20 50	level.		44.576	
4	13 00	30 ft.	4.875	44.576	
5	23 50	30 ft.	8.812	49.451	
6	15 25	30	5.718	40.639	
7	38 25	6 4-10	3.060	46.357	
8	103 01	level.		43.297	
9	6 51	30	2.441	43.297	Schuylkill bridge,
10	2 00	level.		45.738	
11	41 60	360	187.186	45.738	
12	2 13	level.		232.924	Head of inclined plane.
13	74 13	30	27.798	232.924	
14	63 65	30 8-10	24.505	260.722	
15	41 92	30	15.719	285.227	
16	29 00	22 4-10	8.120	300.946	
17	11 00	28	3.850	309.066	
18	15 00	28	5.250	365.216	
				310.466	

At Buck Lane bridge.

Rudolph's summit,

19	114	91	30	43.091	353.557
20	22	28	24	6.684	346.873
21	13	00	26	3.994	350.867
22	9	83	18 5-10	2.072	348.795
23	11	00	18 25-100	2.311	351.106
24	12	00	level.	30.083	351-106
25	81	97	29 36-100	7.875	381.189
26	11	00	level.	381.189	381.189
27	22	50	28	3.850	389.064
28	14	00	22	.812	392.914
29	7	00	9 3-10	392.102	392.102
30	5	00	level.	392.102	392.102
31	36	00	27	12.150	379.952
32	113	75	30 16-100	42.884	422.836
33	35	23	27	11.889	410.947
34	4	00	24	1.200	412.147
35	34	95	28	12.232	399.915
36	43	73	24	13.119	386.796
37	16	00	25	5.000	391.796
38	10	00	24	3.000	388.796
39	4	00	26	1.300	390.096
40	13	00	28	4.550	385.546
41	7	89	24	2.367	387.913
42	4	75	11	.654	387.259
43	64	20	27 52-100	22.084	409.343
44	10	00	27	3.375	412.718
45	17	50	28	6.125	418.843
46	50	99	30	19.121	437.964

B.—CONTINUED.

	Length of each grade in chains.		Rate per mile.		Amt. of each grade in feet:	Height of road from high tide.	Remarks.
	chs.	llcs.	asc.	desc.			
47	22	00	30	82-100	8.475	446.439	
48	130	78	30		49.043	495.482	
49	60	84	28		21.294	516.716	
50	13	00		25	4.061	512.715	
51	10	00	26		3.250	515.965	
52	11	00		24	3.300	512.665	
53	11	00		level.		512.665	
54	15	30		26 2-10	5.010	507.655	
55	50	55	30		19.331	526.986	
56	6	00		level.		526.956	
57	48	50	27		16.355	543.341	Near Paoli tavern.
58	30	82		28	10.746	532.595	
59	11	93		level.		532.595	
60	35	00	25		10.934	543.529	Thomas' summit.
61	6	75		27 4-10	2.311	541.218	
62	2	25		level.		541.218	
63	20	12		24	6.000	535.218	{ Intersectoin of West Chester rail-way, distance from Broad street to this point 1792.48 ch.
64	1	00		level.		535.218	
65	7	50	28		2.625	537.843	
66	1	00	14		.175	538.018	
67	1	00		level.		538.018	

Valley creek bridge.

East Brandywine bridge.

68	1	00	14	.175	537.843
69	61	59	28 1-10	21.632	516.211
70	22	69 $\frac{1}{2}$	28	7.945	508.266
71	150	68 $\frac{3}{4}$	28 1-10	52.920	455.346
72	91	(8 $\frac{1}{4}$)	28	32.092	423.254
73	44	98 $\frac{1}{4}$	28 1-10	15.801	407.453
74	57	82	28 2-10	20.380	387.073
75	95	78 $\frac{3}{4}$	29 2-10	34.959	352.114
76	123	04 $\frac{3}{4}$	29	44.660	307.454
77	10	05	18	2.261	305.193
78	162	31	29	58.891	246.302
79	1	00	18	.225	246.077
80	1	00	level.		246.077
81	8	35	23	2.412	248.489
82	6	92 $\frac{1}{2}$	13 $\frac{1}{2}$	1.170	249.659
83	4	30	15 2-10	.819	250.478
84	3	00	22	.824	251.302
85	45	75	30	17.156	268.458
86	4	00	28	1.400	269.858
87	1	15	12	.175	270.033
88	14	76	level.		270.033
89	2	00	13	.325	270.358
90	62	00	26	20.150	290.508
91		50	15	.094	290.602
92	1	00	level.		290.602
93		50	12	.075	290.527
94	10	11	27 $\frac{1}{2}$	3.476	287.051
95		50	14	.087	286.964

B.—CONTINUED.

	Length of each grade in chains.		Rate per mile.		Am't. of each grade in feet.	Height of road from high tide.	Remarks.
	chs.	llks	asc.	desc.			
96		50				286.964	
97	1	00	15	level.	.187	287.151	
98	120	23	27½		41.326	328.477	
99	54	31	27¾		18.825	347.302	
100	67	31¾	27½		23.137	370.439	
101		50	20		.125	370.564	
102	1	00		level.		370.564	
103		50		13	.081	370.483	
104	15	56		27½	5.347	365.136	
105	1	00		level.		365.136	
106	10	98	20		2.745	367.881	
107	1	00		level.		367.881	
108	40	75		13 4-10	6.829	361.052	
109		62		level.		361.052	
110		50	13		.081	361.133	
111	29	81	26		9.686	370.819	
112	2	00	13		.325	371.144	
113	24	88		level,		371.144	

{ West Brandywine bridge, distance from Broad-
 } way to this point 3184.06 chains.

Table exhibiting the sum of the curves of the Columbia and Philadelphia Rail way. Commencing at Broad and Callowhill-streets, and extending to Coutesville. The line commences with a curve of 300 feet radius for seven chains to avoid damage to private property.

	1° 3783 ft. radius.	2° 1891 ft. radius.	3° 1260 ft. radius.	4° 946 ft. radius.	5° 757 ft. radius.	6° 631 ft. radius.	300 ft. radius.
Straight.	ch.	ch.	ch.	ch.	ch.	ch.	ch.
chains.							
304.54		19.00	5.85	47.96	29.30	10.00	7.16
399.76			93.81	81.60	55.72		
170.56			37.00	75.90	49.79	18.78	
207.46		42.04	66.54	55.21	13.50	28.77 $\frac{3}{4}$	
140.23 $\frac{1}{4}$		4.37 $\frac{1}{2}$	6.12 $\frac{1}{2}$	33.25	33.90		
316.63 $\frac{1}{4}$		2.75	17.87 $\frac{1}{2}$	51.87 $\frac{1}{2}$	29.03	24.90	
450.68 $\frac{3}{4}$	6.00	17.00	26.62 $\frac{1}{2}$	13.33			
132.04 $\frac{1}{4}$	11.75		42.41 $\frac{1}{2}$	8.00			
2121.92 $\frac{1}{4}$	17.75	85.16 $\frac{1}{2}$	296.24	362.12 $\frac{1}{2}$	212.24	82.45 $\frac{3}{4}$	7.16

The above tables were furnished by W. H. Wilson, Esq., civil engineer employed during the construction of the road, and may be relied on as correct.
J. P. B.

MESSAGE

FROM

THE GOVERNOR,

RELATIVE TO THE BILL ENTITLED

“AN ACT

TO PROVIDE FOR THE REPAIRS AND EXPENSES OF THE STATE CANALS
AND RAILROADS, AND CONTINUING THE WORK ON THE ERIE EXTEN-
SION AND NORTH BRANCH DIVISION OF THE PENNSYLVANIA
CANAL, AND FOR OTHER PURPOSES.”

Wm. A. Governor.

Read in Senate, January 9, 1838.

HARRISBURG:

THOMPSON & CLARK, PRINTERS.

....
1838.

1870

1870

THE GOVERNOR

OFFICE OF THE GOVERNOR

1870

AND THE GOVERNOR OF THE STATE OF NEW YORK
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OFFICE OF THE GOVERNOR

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MESSAGE.



To the members of the Senate and House of Representatives:

GENTLEMEN—Late on the 19th of last month, I received the Bill entitled “An act to provide for the repairs and expenses of the State canals and railroads, and continuing the work on the Erie extension and North Branch divisions of the Pennsylvania canal, and for other purposes.”

The bill having become a law without the executive signature, by the lapse of time, agreeably with the twenty-second section of the first article of the State constitution, is now returned, that the necessary certificate may be affixed to it by the proper officers. Permit me, at the same time, to offer the following remarks in relation to it.

When the bill was first presented to me, I deemed it my duty, on full examination of its provisions, to withhold my approval from it, and return it, with objections, to the Senate, in which it originated. The performance of this grave task required some time, that the reasons might be fully explained to the Legislature and the people. The message on the subject was not, therefore, ready for delivery, till a few moments after the adjournment of the Senate for the day, at noon, on the day after the bill was presented to me. When that body met, on the morning of the 21st, to adjourn over the Christmas holidays, there was not a quorum present; so that I was again prevented from returning the bill, as I was anxious to do, without loss of time. In this manner, without my instrumentality, the *first of January* passed, before the bill could be returned. I allude to these circumstances now, for a reason which will presently be explained.

The general objections to the bill, were—

Either, that it was the only provision for the matters embraced in it, intended to be made by the present Legislature, and was, therefore, wholly inadequate to the pressing wants of the public works:

Or, that if any further appropriations were contemplated, their fate was to depend on that of others of a different character and of doubtful expediency:

And, that the bill involved a breach of the public faith, by ordering the suspension of operations on a public work, without making full provision for the payment of all the debt actually due upon it to contractors and laborers, by the State, for work done; and to farmers and other owners of real estate, for the whole amount of damage caused by its incomplete construction.

I do not claim infallibility for the estimates of the public officers, nor expect implicit compliance with executive recommendations. But, when legislation, expressly grounded on those estimates and recommendations, differs materially from them, either they must have been erroneous, or the legislation is insufficient. I am compelled to believe that the latter is the case, in the present instance.

On examining the bill, the conclusion was almost irresistible, that it was intended as the final provision of the present session, so far as it relates to the repairs of the public works. If further provision were contemplated, an equal and proportionate reduction of all the indispensable items would have been made; and such as were not of urgent necessity, postponed. But this was not done. The ordinary repair fund, whose early and certain appropriation is a matter of the most vital importance to the use of the finished works, and to the revenue of the State, is reduced to a sum insufficient to pay the debts which were due on the first instant. The appropriation to the line of railroad to avoid the Columbia inclined plane, a work which should be pushed on with all possible despatch, so as to be used early next summer, is decreased to an amount entirely inadequate to its vigorous prosecution, after paying the debts now due. The appropriation to put the feeder dams in such order as to insure a full supply of water, the want of which has been, annually, such a source of delay, expense and loss, is so small as to defeat that object. The deepening of that portion of canal south of Duncan's island dam, and the construction of additional locks, is estimated at \$24,000. This work, so far as

relates to the deepening of the canal, and the correspondent alteration of the present locks, which are so necessary to the profitable use of the whole main line, can only be accomplished in the winter, so as to be ready for the spring business; and yet, only \$5,000 are given to it by the bill. On the Gettysburg railroad, there were \$60,000 due on the first instant; or, if the retained per centage be included, \$100,000. Yet the present appropriation is only \$45,000.

On the other hand, works and objects whose necessities are by no means so urgent, received the full estimated amount. The whole sum required towards renewing the eastern portion of the north track of the Philadelphia and Columbia railroad, is given; though it is well known that that amount cannot all be immediately expended. The amount required for ropes, &c., the whole of which is given, will not be needed till next spring; before which time, those articles cannot be delivered on the Portage railroad, where most of them are to be used. The means to pay canal commissioners, appraisers, engineers, &c., are provided, while the fund to compensate for damage to private property, by the State works, is wholly omitted. And, finally, an appropriation is made to the Erie extension, upon which no additional funds will be required till February; while the same amount is only appropriated to the much more urgent wants of the North Branch, on which there was \$55,000 of debt due on the first instant.

This difference in apportioning the sums, could not have proceeded from any want of money: for the treasury is full. It did not arise from the desire to save interest, for though the funds of the State, out of which the appropriations must come, are at interest, yet the mere appropriation of the sums, now, will cause no loss. The greater part of the money will not be drawn from the present depositories till after the time when the balances refused by this bill must be given, if given at all, by the present Legislature.

Taking the bill thus as the final measure of the Legislature on the subject of repairs, I could not sanction it, nor allow the occasion to pass, without attempting to arrest a step so fraught with ruin to the public interest next season. The rising of the Legislature without another repair bill, would set every mile of canal and railroad in the state idle before midsummer.

There could be only one other mode of accounting for this reduction of appropriations, which must be given sooner or later, if the

public interest is not sacrificed. It appeared barely possible that the intention might be to make the fate of the balance of them depend on that of other doubtful projects and conflicting claims. In such a determination, I could not participate, and came to the conclusion, at once, and at the commencement of the session, when there was sufficient time to discuss the matter fully, to put the question to the Legislature, and to the people of the State, whether the soundest policy and economy do not render it incumbent upon the public agents, *first, fully, and unconditionally* to provide for the indispensable wants of the finished portions of the public works; and *afterwards*, to appropriate the balance of the public means to other proper purposes?

These impressions, viz: either that it was to be the only repair bill of the session, or, that the balances of the various items were to be involved in the fate of other matters, I am happy to avow, have been materially weakened by a full and free interchange of sentiments with many members since the adjournment. I have been assured that every desire is entertained to promote, by all proper means, the early preparation of the public works for the trade of the approaching season, and feel confident that the necessary measure will be adopted.

The adjournment has also removed the other objection to the bill. One of its provisions appropriates towards the construction of the Gettysburg railroad, "to be applied in payment of work actually done prior to the *first day of January next*, forty-five thousand dollars: and the Canal Commissioners are directed to give notice to the contractors, to suspend their work upon the said railroad, from and after the *first day of January next*." Had the bill become a law, either with the executive signature, or by the votes of two-thirds of both branches of the Legislature, in *December*, the intention of the Legislature in ordering the suspension of operations on the first of the present January would have taken effect. But as it is, such will not be the result. In consequence of the fact, that an opportunity was not afforded to return the bill to the Senate previous to its adjournment in December, and that the bill becomes a law after the first day of January, 1838, the result is inevitable, that the "*first of January next*" mentioned in it, will mean the first of January, 1839, and that it must be construed and carried into operation accordingly.

This accidental circumstance, over which I had no control, and to prevent which I used my utmost diligence, is on the whole fortunate,

as it will enable the Canal Commissioners to apply the sums given by the bill, to the payment of debt on the works so far as they will extend, and will afford the Legislature a full opportunity to review their decision relative to the suspension of operations on the road in question.

For these reasons, I have been induced to allow the bill to become a law by the lapse of time ; and I can assure the Legislature, that it is very pleasant to take this course instead of opposing their decision.

In connexion with the abandonment of a public work, many important considerations present themselves. The actual breach of faith which it involves, should not, for a moment, be tolerated, unless in the contingency that the State is actually unable to complete the improvement, or that the citizens of the counties concerned, and the public interest, do not require its completion. While public honor and faith mean anything, the question of the original necessity and expediency of the work must be conceded to have been settled by the Legislature that commenced it. Abandonment can only be the offspring of unavoidable public necessity, or of the wishes of all the parties interested. It should also be borne in mind, that while the damage to private property, caused by the construction of a completed and useful improvement is trifling, that of one half-finished and abandoned, must be very great. Such a course produces nothing but injury, without any benefit, and must be paid for accordingly.

Whatever may be the conclusion of the Legislature on this or any other similar question, I can never consent to any measure, having for its object the suspension or abandonment of a State work once commenced, unless full provision be at least made for the payment of every dollar of debt due, and for the full and instant compensation of all damages caused to private property.

Having thus explained my course with regard to this bill, permit me to urge the necessity of instant and further legislation on many of the subjects embraced in it. Most of the following additional appropriations are indispensably and immediately necessary to the welfare of the public improvements ; and all of them are such as must be made before the close of the session, if the public works are not to be abandoned.

The balance of the ordinary repair fund,	\$ 180,000
Do. to repair the feeder dams,	51,000
Do. for railway to avoid the inclined plane at Columbia,	50,000

Do. to construct additional locks and deepen canal below Duncan's Island,	\$19,000
Do. for the Gettysburg railroad,	55,000
Annual appropriation for damages,	30,000

The balance of the ordinary Repair Fund should be instantly placed at the disposal of the Canal Commissioners, not only to enable them to make the arrangements and repairs necessary for an early commencement of the spring trade, but to inform them of the whole amount to be relied on for the season's operations in this department. From the best information I can obtain, the sum already given will not pay the debt unavoidably incurred up to the 1st inst. There has not been a winter, since the commencement of the system, so favorable for making the usual repairs, as the present. Much of the necessary work has already been done—one supervisor alone has had three hundred men engaged, so anxious are the public officers to take advantage of the propitious season. A single hand can now accomplish as much work as two when frost and ice are to be contended with. If the balance of the fund be given without delay, and the present favorable weather continue a few weeks, the canals will be in better order, and may be filled for navigation earlier than on any former occasion.

The remainder of the sum necessary to repair the feeder dams, which have been so great a source of vexation and delay, should not be withheld a moment unnecessarily. The greater part of the expense of repairing them, consists in the cost of the timber and stone used. It is well known, that contracts for furnishing these articles, must be made a considerable time before they can be delivered. These contracts should be made, and the materials on the ground at the earliest possible moment, so as to improve the first opportunity of low water, to apply them to their destined use.

The inclined plane at Columbia is necessarily maintained at a large expense to the State, which will be wholly dispensed with, when the railway around it is in use. This will also obviate the delay on that part of the road which is now so vexatious to travellers and transporters. The work on the new road is of a nature that can be nearly as readily performed in winter as summer. It is said that the whole may be completed by the 1st of July, if the full appropriation be now given. The sum set apart for it by the bill returned, is little more than sufficient to pay the debts due up to this time.

So fully convinced are the Canal Board of the speedy necessity of measures to increase the locks at Duncan's Island, that they have issued instructions to the supervisor to advertize a letting of that work, to be commenced on condition that the necessary funds shall be provided by the Legislature. All who are aware of the delays and confusion that occur at that point, in time of low water, and of the fact that the greater part of the work requisite to obviate the difficulty must be performed in the winter season, will at once see the instant propriety of a full and immediate appropriation.

In support of the balance of appropriation to the Gettysburg railroad, it need only be said, that a great portion of the money is already due, and that the remainder will barely carry on operations till the main improvement bill is passed.

The annual appropriation for damages is included in the present list, because it is a standing item of undoubted propriety, and one which should be provided for among the first, that the claimants for this kind of compensation may be assured of satisfaction from the State.

On these grounds, I would respectfully but earnestly urge upon the Legislature the immediate passage of a bill making the appropriations above specified. It is rendered imperative by every consideration of prudence, economy and patriotism. It is merited, I may be permitted to say, in behalf of the public agents, by the manner in which the different divisions were managed, and made to produce revenue during the past season. And it is required, in order to make such preparations as will maintain and increase the high character which the "Pennsylvania route" has acquired.

The time has arrived, when some systematic course of legislation for the annual support and progress of the State works, can no longer, with safety, be dispensed with. The principles on which it should be founded are simple and obvious.

We have an incomplete system of canals and railroads, constructed at the expense of a debt so vast that its permanent increase cannot now be thought of. Neither will it be just to perfect it by a general State tax, because the benefits of the system are not, and can never be, as general as the tax. Some other resource must be discovered.

Though the system, as a whole, is incomplete, yet portions of it, especially a chain of canal and railway from Philadelphia to Pittsburgh are finished and in operation. This must be our reliance.

All the care and energies of the public agents should be devoted

to the keeping in the most perfect repair, and to the most economical and efficient management, of the finished portions of the public works, for the purpose of making them yield an income equal, in the first place, to the interest of the State debt and to the annual cost of repairs; and in the second place, to the gradual progress of the incomplete portions to a state of perfection. That this is practicable, the operations of the past season, even under every disadvantage, will show. The same, or an improved system of management, (for I am aware that it still requires improvement,) will produce wonderful results next season, if the public agents be not crippled for want of means. And in two years, the works will not only clear themselves, but aid materially in the completion of the whole system.

Under this impression, permit me to offer for consideration the following rules for appropriation to internal improvement purposes, with the remark, that so essential do I deem them to the good of the State, that they shall hereafter be my principles of action on the subject, so far as the recommendatory powers of the Executive extend.

1st. That ample provision be made, annually and early in each session, for the repair and improvement of the finished portions of the public works, unconnected with any other matter, so as to insure the greatest possible income from them; and,

2d. That the balance of the public means applicable to the purposes of internal improvement, be devoted to the completion of the unfinished portions, before any further considerable undertakings of a like kind are commenced.

In adherence to these principles, unless I am very much mistaken, the general interests of the whole State will find their best support; and the unfinished branches and extensions, their surest means of speedy completion.

JOS. RITNER.

EXECUTIVE CHAMBER, Harrisburg, January 9th, 1838.

ANNUAL REPORT

OF THE

M A N A G E R S

OF THE

UNION CANAL COMPANY

OF

PENNSYLVANIA,

TO

THE STOCKHOLDERS.

NOVEMBER 17, 1835.

Philadelphia:

PRINTED FOR R. P. DESILVER.

1835.

At the Annual Meeting of the Stockholders of the Union Canal Company of Pennsylvania, held at their Office, in Carpenter's Court, November 17, 1835, the following Report was presented, read, and accepted; and is now printed in compliance with the provisions of the charter.

On the same day the following Gentlemen were elected to manage the affairs of the Company for the ensuing year.

PRESIDENT.

JACOB GRATZ.

MANAGERS.

WILLIAM BOYD,
CHARLES GRAFF,
WILLIAM W. FISHER,
FRANCIS G. SMITH,
WILLIAM Y. BIRCH,
GUSTAVUS CALHOUN,

GEORGE VAUX,
JOSEPH HOPKINSON,
THOMAS BIDDLE,
WILLIAM H. KEATING,
JOHN BOHLEN,
THOMAS W. MORRIS.

REPORT.

IN presenting their Annual Report, in obedience to the requisitions of the Charter, the President and Managers of the Union Canal Company of Pennsylvania, have peculiar satisfaction in communicating to the Stockholders, that, during the last year, the Canal has afforded a navigation entirely uninterrupted by either breaches, or a deficiency of water; a gratifying evidence of the increasing permanency and retentiveness of the embankments; that the trade has considerably augmented, and the receipts from tolls have exceeded those collected in any previous year, notwithstanding a great reduction in the rates of toll took place in February last.

Although the Canal is but in its infancy, it has, in connexion with the Schuylkill navigation, and the magnificent improvements of the State, conduced to an enlarged intercourse with the interior, encouraging, by cheapness of transportation, the remote agriculturalist and manufacturer, to transfer to our metropolis, the various productions of their industry, opening new markets for the inexhaustible deposits of coal and iron, the valuable timber, and other immense resources with which Pennsylvania abounds, and promoting, by its invigorating influence, the prosperity and opulence of our enterprising community.

Convinced that the Union Canal is destined to participate extensively in the expanding commerce between the

Atlantic and the fertile regions of the West, the Managers have persevered to make it an attractive, safe, and cheap avenue, adequate at all times to accommodate whatever amount of business may seek its channel; in attaining this, many obstacles and embarrassments have been encountered; having conquered all discouragements, and achieved a work of great public utility, they anticipate that the period is not remote, when this important improvement will return a liberal remuneration to all who have embarked in the enterprise.

During the last two years, large expenditures have been incurred in the prosecution of permanent improvements and repairs, indispensable to preserve an unimpaired navigation, and to remedy deficiencies; most of these are completed; that of the greatest magnitude, the new feeder, from the Water Works to the summit level, to supersede one fallen into decay, will be entirely finished in the present month; materials are provided to prosecute other works in the approaching winter; when these shall be completed, the expenditures will be much retrenched, and be limited to the incidental charges of keeping the Canal in order.

To impart a knowledge of these improvements, they are concisely enumerated:—

The new feeder from the Water Works, on Swatara, to the summit, is three and one-third miles in length; it is circular, three feet six inches in diameter, internally in the clear. A part, (seven thousand four hundred and fifty feet,) is constructed with hard bricks laid in hydraulic cement, and is perfectly water-tight; the remaining part, ten thousand three hundred and ten feet,) is composed of cylinders fitted into each other, made of white pine staves three inches thick, hooped with iron

bands, and supported by strong timbers, resting on stone foundations; as no part of the wood work is in contact with the ground, it will not be liable to premature decay.

As the principal supply of the summit is derived from the Water Works, and is to pass through this conduit, every effort has been exerted to make it answer the important purpose for which it is designed, two miles having been in use since April last, its great utility has been demonstrated by the increased quantity of water it has discharged into the summit.

The bottom of the summit has been lined with two inch plank for the distance of nearly four miles; it is intended to extend the lining, during the approaching winter, about three-fourths of a mile further, for which purpose the necessary materials are provided. Several levels east of the summit, and two levels to the west, below Hummelstown, all of which pass through limestone, have been planked for the distance of seven hundred and eleven rods.

Plank, and other materials are provided, to line, during the winter, seven hundred and seventy-five feet on the navigable feeder, where large sinks in cavernous limestone have frequently occurred. It is believed that there are no other parts of the Canal which will require a resort to this method of preventing the loss of water.

A Collector's house at Middletown, and thirty-five Lock-keepers' houses, have been built, embracing all the points where they can be required.

Two weighing locks, one of them erected at Reading, the other at the Water Works, have proved useful in ascertaining the accurate weight of boats, and preventing impositions on the revenue.

Most of the aqueducts have been thoroughly repaired,

and materials provided to rebuild, during the winter, the large aqueduct on the navigable feeder across Swatara, and one below Reading.

A new feeder dam has been erected in Swatara Creek, and all the dams and feeders in the line repaired and strengthened.

The additional feeder introduced in the summit, by transferring to M'Laughlin's Pond one of the steam-engines from the Water Works, has proved so beneficial, that all apprehensions of a scarcity of water on the summit, even in the driest seasons, are dispelled.

Five hundred and sixty feet of iron pipes for a new main have been laid down at the Water Works, many bridges rebuilt, and materials provided for rebuilding others.

Many other extensive improvements and repairs have been made, and the Canal, throughout its entire length, is now placed in a condition calculated to confirm the confidence entertained of its stability, its abundant supply of water, and to insure a regular unimpeded navigation to the most active trade that may be presented.

Subsequently to the Report made in November last, the Canal continued open until 16th December, when it was obstructed by ice; on the 20th of March, the navigation was resumed, since which time it has been exempt from the slightest embarrassment.

The tolls received from 1st Novem-

ber, 1834, to the 1st November,

1835, amount to - - \$135,254 20

The tolls collected the preceding year,

were - - - - 119,870 53

Showing an increase of - - \$15,383 67

or nearly thirteen per cent.

	TONS.
The trade conveyed on the Canal this year,	
was - - - - -	118,978
The trade of the preceding year, was -	84,536
	<hr/>
Showing an increase of - - - - -	35,442
tons, or upwards of forty per cent.	

This great improvement of business, although it has not produced a corresponding increase of revenue, (owing to the reduction of tolls before adverted to,) is abundantly encouraging; the future promises to be still more propitious; the extensive improvements of the State, now in active and successful operation, will contribute to your Canal such an accession of trade as must realize a revenue equal to the most sanguine calculations.

The progressive advancement of business, since the Canal has been in operation, is shown in the following statement:—

YEARS.	TONS.	TOLLS.
1828,	18,124	\$15,512 10
1829,	20,522	16,676 11
1830,	41,094	35,133 82
1831,	59,970	59,137 21
1832,	47,645	59,061 06
1833,	85,876	103,462 45
1834,	84,536	119,870 53
1835,	118,978	135,254 20

The articles which this year have increased most in quantity, are such as will continue to augment with the improvement and prosperity of the country.

Flour, grain, and tobacco, have in-				
creased about	-	-	-	50 per cent.
Iron coming East,	-	-	-	90 „
Merchandise,	-	-	-	33 „
Bituminous Coal,	-	-	-	100 „
Anthracite Coal from Swatara Mines,				100 „

The coal trade from Pine Grove, which has heretofore been inconsiderable, is commencing to develop its importance; nearly twelve thousand tons were shipped this season, principally by one establishment; the great abundance and superior quality of this coal, with the increasing demand for it, will stimulate other individuals to open mines, and furnish to the Branch Canal a permanent and flourishing business.

Damages to the amount of \$5,878 32, have been paid within the last year; some cases are adjusted, but not yet settled, and a few claims yet remain for settlement.

It may be proper to remark, that at any time after 1st January, 1836, the Company will have the option to pay certain loans amounting to \$830,400, unless the proprietors shall convert their respective amounts into shares of the capital stock prior to that day, the right of convertibility appertaining to such loans, expiring with the present year; if they be not paid off by the Company, the interest will continue to be paid as heretofore, until notice for their redemption be given.

Annexed will be found the Treasurer's annual account of receipts and expenditures, also a statement of the articles and tonnage conveyed through the Canal within the past year.

In conclusion, the Board congratulate the Stockholders upon the success which has attended the early career

of the Canal ; like all similar improvements, in their commencement, it has encountered periods of trial and perplexity ; this ordeal is happily passed. The present improved condition of the works, the abundant supply of water with which it is furnished, the trade it has attained, and the flattering prospects of rapidly augmenting business, all give assurances of future prosperity and productiveness.

All which is respectfully submitted, by order of the Board of Managers.

JACOB GRATZ *President.*

*Union Canal Office, }
Nov. 17th, 1835. }*

gers from November 1, 1834, to February 1, 1835, viz.—	
Salaries to officers	\$ 1,125 00
Remitted Wm. Lehman, resident engineer, to meet payments at Lebanon for improvements and repairs, lock keepers', collectors', and superintendents' wages, damages and incidental expenses	26,160 44
Paid for professional services	200 00
Paid collector at Fair Mount	270 00
Paid current expenses, printing, stationary, rent, postage, &c.	448 71
Paid balance due Wm. Stevenson's estate	114 60
Paid balance due Bank U. S.	34 53
Paid on account of coal delivered at the Water Works	600 00
Paid in full for lead	210 36
Paid one quarter's interest on loans due January 16, 1835	25,008 00
Paid damages at Middletown	725 23

\$ 54,896 87

To Cash expended from February 1, 1835, viz.—	to May 1,
Salaries to officers	\$ 1,273 00
Remitted Wm. Lehman, resident engineer, to meet payments at Lebanon for improvements and repairs, wages to lock keepers, collectors, and superintendents, damages and incidental exp.'s	30,718 34
Paid interest	85 00
Current expenses	213 40
Damages \$480 29, and professional services, \$500	980 29
Interest on stock and loans due April 16	39,112 50

\$ 72,362 53

By Cash received from November 1, 1834, to February 1, 1835, viz.—	
From tolls	\$17,941 39
From land sold on Columbia Rail Road	1,522 50
From Joseph Good, amount returned by him	25 00
From sales of State loan of 4½ per cent.	50,000 00

69,488 89

By Cash received from February 1, to May 1, 1835, viz.—	
From interest on State loan of 4½ per cent.	\$ 4,050 00
From tolls	21,837 13
From sales of State loan, and premium thereon	30,351 00
From sales of limestone, scraps, rent of oil-mill, and rent of saw-mill,	307 20

56,545 33

By Cash received from May 1, to August 1, 1835, viz.—	
From tolls	\$ 50,728 31
From limestone sold at Lebanon	6 93
From rent of schute at Pine Grove	100 00
From lumber sold	114 67
From sales of State loan and premium	102,580 00
From temporary loans	23,000 00
From sales of loan of \$520,000, and premium	7,737 64

184,267 55

By Cash received from August 1, to November 1, 1835, viz.—	
From tolls	\$44,503 57
From interest on State loan of 4½ per cent.	2,250 00
From temporary loans	43,999 00

To Cash expended from May 1, to August 1, 1835.

viz.—	
Salaries to officers	\$ 1,325 00
Remitted Wm. Lehman, resident engineer, to meet payments at Lebanon for improvements and repairs, wages to lock keepers, collectors, and superintendents, incidental expenses, &c.	13,958 49
Paid for bricks, toll, &c., for tunnel feeder,	968 91
Paid for iron pipes, \$3,266 58, ground at Reading, \$500	3,766 58
Paid current expenses, surveys, and oil for water works and steam-engine, &c.	1,093 51
Paid interest due on loans 16 July	25,612 50
Paid certificates of interest, and the interest thereon	141,202 79
To Cash expended from August 1, to November 1, 1835, viz.—	187,927 78

To Cash expended from August 1, to November 1, 1835, viz.—

Salaries to officers	\$ 1,612 50
Remitted Wm. Lehman, resident engineer, to meet payment at Lebanon for improvements and repairs, wages, incidental expenses, &c.	18,244 74
Current expenses, scales at Pine Grove, \$ 642 58, damages, \$1080	1,722 58
Temporary loans, with the interest	18,078 33
Certificates of interest, with the interest thereon	11,890 32
Interest paid on State loan to purchasers by contract	2,250 00
Interest to Stock and Loanholders	28,653 00
Bricks and tolls thereon for tunnel feeder	1,823 37
Balance	84,274 84
	10,327 95

From castings sold at Lebanon	16 79
From lumber and band iron sold	1,020 96
From interest on loan	150 00
From sales of land on Columbia Rail Road	643 75

92,584 07

\$409,809 97

Statement of the Amount of Tonnage which passed the Union Canal, from the 1st of November, 1834, to the 1st of November, 1835.

	Weighing Pounds.
Flour, 84,210 barrels	18,019,024
Wheat and Flour, 505,810 bushels	30,348,615
Whisky, 12,679 barrels	3,803,784
Iron, bar, pig, and castings 15,482,821	} 23,407,992
Iron, Rail Road 1,746,870	
Iron ore, 6,178,301	
Coal, anthracite 31,117,631	} 43,549,067
Coal, bituminous 12,431,436	
Lumber, 11,340,000 feet	24,716,048
Shingles, 5,807,000	6,504,064
Staves	1,808,643
Gypsum	22,818,695
Fish, 26,338 barrels	7,901,420
Salt, 72,386 bushels	4,343,184
Merchandise	44,736,370
Tobacco	3,244,904
Wool	799,484
Seeds, of all kinds	1,358,747
Bacon	2,509,681
Sundries—consisting of earthenware, queensware, hemp, butter, lard, live hogs, pork, marble, bricks, lime, limestone, &c.	25,957,542
Pounds,	265,827,264

Comparative statement of the amount of Tolls passed the Union Canal, from the 1st of November, 1833, to the 1st of November, 1834; and from the 1st of November, 1834, to the 1st of November, 1835.

November 1, 1833, to November 1, 1834.		November 1, 1834, to November 1, 1835.	
Flour, 63,972 barrels	Tons, 6,111	Flour, 84,210 barrels	Tons, 8,044
Wheat and Rye, 299,818 bushels	8,030	Wheat and rye, 505,810 bushels	13,548
Whisky, 13,627 barrels	1,825	Whisky, 12,678 barrels	1,698
Iron, bar, pig, and castings	3,617	Iron, bar, pig, and castings	6,911
Iron, ore	1,173	Iron, ore	2,758
Coal, bituminous	2,578	Coal, bituminous	5,549
Coal, anthracite	6,911	Coal, anthracite	13,891
Lumber	12,995	Lumber	11,340
Shingles	3,139	Shingles	2,903
Staves	593	Staves	807
Tobacco	1,010	Tobacco	1,448
Merchandise	14,741	Merchandise	19,971
Fish, 16,920 barrels	2,266	Fish, 26,338 barrels	3,527
Salt, 88,109 bushels	2,360	Salt, 72,386 bushels	1,938
Rail iron	2,575	Rail iron	779
Gypsum	8,644	Gypsum	10,186
Sundries—consisting of flaxseed, hemp, wool, clover seed, lard, butter, pork, live hogs, bacon, leather, limestone, lime, marble, bricks, grindstones, fruit, &c.	5,962	Sundries—consisting of lard, butter, pork, hogs, leather, lime, limestone, marble, bricks, grindstones, burr-blocks, fruit, earthen and queens-ware, &c.	2,083
Total number of boats which passed the Canal this year	84,536	Total number of boats which passed the Canal this year	11,588
Amount of tolls received during the year ending 1st November, 1834	5,927	Amount of tolls received during the year ending 1st November, 1835.	118,978
	\$119,870 53 Cts.		7,131
			\$135,954 20 Cts.

Philadelphia, November 1, 1835.

THOMAS P. ROBERTS, Treasurer.



ANNUAL REPORT

OF THE

MANAGERS

OF THE

UNION CANAL COMPANY

OF PENNSYLVANIA

TO THE STOCKHOLDERS.

NOVEMBER 21, 1837.

PHILADELPHIA:

Printed by R. P. Desilver, No. 255 Market Street.

1837.

At the Annual Meeting of the Stockholders of the Union Canal Company of Pennsylvania, held at their Office, in Carpenter's Court, November 21st, 1837, the following Report was presented, read, and accepted; and is now printed in compliance with the provisions of the Charter.

On the same day the following Gentlemen were elected to manage the affairs of the Company for the ensuing year:

PRESIDENT.

WILLIAM BOYD.

MANAGERS.

CHARLES GRAFF,
WILLIAM W. FISHER,
FRANCIS G. SMITH,
JOSEPH HOPKINSON,
THOMAS BIDDLE,
WILLIAM H. KEATING,

JOHN BOHLEN,
THOMAS W. MORRIS,
CHARLES DUTILH,
GERARD RALSTON,
SIMEON TOBY,
FREDERICK FRALEY.

R E P O R T.

In compliance with the provisions of the charter, the President and Managers of the Union Canal Company respectfully submit to the stockholders their annual report :

The navigation on the canal ceased last fall on the 26th of November, and was resumed on the 22d of March, 1837 ; since which time it has continued uninterrupted except for a few days in September, while some necessary repairs were made on the feeder. The main line of the canal has required none but the ordinary repairs. It has been all the season in excellent condition, and it continues so still. The supply of water has been ample at all times, and another year's experience confirms the former statement of the board, that entire confidence may be placed in the sufficiency of the supply of water. With the amplest means to procure any additional quantity, the board are confident that the canal may be made able to pass any amount of trade that may be brought to it.

Upon this point, the report of the able and experienced engineer, selected last year to examine the whole line of the canal, and ascertain the practica-

bility of enlarging its dimensions, is conclusive. The board have for many years past had their attention directed to this subject, and the result of long and mature reflection and observation has been, that, placed as the Union Canal is, as a connecting link between two highways of much larger dimensions, it cannot be as useful to the public, or as profitable to the stockholders, as it might otherwise be, unless its dimensions be made to correspond with those of the Pennsylvania or Schuylkill Canal. While those works admit of a navigation by boats carrying from fifty to sixty tons, the boats on the Union Canal seldom exceed twenty-five tons burthen; the effect of which is, that much of the trade of the interior of Pennsylvania, which should come to Philadelphia by this canal, is diverted to other improvements. Were it not for this circumstance, the stockholders of the Union Canal Company, would long since have reaped the reward due to the public spirit and enterprise, which distinguished its first projectors. While great expenses are incurred by rival companies, to take away the trade that naturally belongs to us, and to direct it to a rival city, it behoves us to make every exertion to secure the natural advantages which we possess. To this course the proprietors of this Canal are urged, not merely by a regard for the prosperity of our City and State, but chiefly by a judicious attention to the interest and productiveness of the great link entrusted to their management, and in which their funds are invested.

Impressed with these views, the managers promoted an application to the legislature at its last session, for

such an appropriation as would enable them to construct a new set of locks, of enlarged dimensions, so as to admit of its being navigated by boats of the same size as those that travel on the State Canal and on the Schuylkill. With a judicious liberality that indicated the high sense which the legislature entertained of the importance of this work, and by a larger vote than could be secured for any other part of the improvement bill, an appropriation was made in furtherance of the views of the managers; but, unfortunately for us, from circumstances familiar to all, the measure failed of ultimate success.

The Board entertain the most perfect conviction, that it is of vital interest to the stockholders, that the application should be renewed at as early a period as possible of the next session of the legislature; and they entertain strong hopes that the aid of the State may be obtained in a manner, which, while it will afford us a highly improved work, will not interrupt for a single day the navigation of the canal, jeopard the rights of the loanholders, or impair the prospects of the stockholders to early and profitable returns for their past exertions and perseverance.

The tolls collected during the twelve months that ended on the 1st instant, amounted to \$107,590 37. Although this sum falls considerably below the expectations expressed in the last annual report, it is much larger than the board ventured to hope for, after they became aware of the commercial crisis which the country was destined to experience.

Two causes have combined to reduce our tolls below those of the preceding year. The first was the

almost total failure of the wheat and other grain crops throughout Pennsylvania, during the summer of 1836. The disappointment of our farmers was sensibly felt in the revenue of the canal; owing to this cause the transportation of flour and whiskey was reduced to one half, and that of grain to three fourths of what it had been in 1836.

But a still more severe reduction was the effect of the great commercial distress which has marked the present year. Where such a convulsion has occurred, spreading over the whole union; affecting every individual; striking at the prosperity of every interest; arresting every improvement, and palsyng every branch of industry, it could not be expected that the Union Canal alone, should have escaped its influence, and that a revenue depending upon the general trade of the country should have remained unimpaired, while the whole prosperity of the country itself was at a stand.

Accordingly the transportation of merchandise fell to one-third of that of last year; that of wool to one-fourth, and that of tobacco to one-sixth. When we reflect that these are among the articles that pay the heaviest tolls on our canal, it is rather a subject of surprise and congratulation that the effect of it should not have been to produce a proportionate reduction in our revenue. That such has not been the case, is in part due to the growing wants of the country, which actually occasioned an increase in some important branches, such as the transportation of anthracite, iron ore, gypsum, &c. The board also advert with pleasure to the fact that cotton is a new source of income

to the company, this being the first year that the amount has been sufficiently large to justify its being specially enumerated; the same may be said of nails, &c.

The board feel confident, that the depression of the present year may be viewed as entirely of a temporary character; and they doubt not that the returning activity of trade will restore to the canal its due share of business. As an evidence of this, they have pleasure in stating that since the first of November there has been a great revival of business on the canal, and that the tolls of the last three weeks greatly exceed the average of those of the whole year.

Every economy has been practised by the board, consistent with keeping the canal and feeder in good order; new boilers were obtained for the pond engine; a new trunk was erected, more solid and durable, it is believed, than the old one, to conduct the waters from that place to the canal.

In every other respect the ordinary expenses have been reduced to as low a point as was consistent with a judicious economy, and, notwithstanding the severity of the times, the managers were enabled to redeem the hope given in the last annual report, and to resume the payment of interest on the loans in July last. The interest due in July and October has been paid without difficulty.

The managers have felt the most anxious solicitude to settle all the outstanding claims for damages; part of them, to the amount of \$5,634 30, have been liquidated, and more would have been done in this re-

spect, if the Board had met with a corresponding feeling of liberality and justice on the part of the owners of the property through which the canal and its feeders are constructed. That the work has been of immense advantage to the country through which it passes and has greatly enhanced the value of every farm on the line, there can be no doubt, and yet, far from producing a favourable effect, the board have been and still continue to be exposed to numerous harassing and extravagant demands.

The managers regret that it becomes their duty to inform the stockholders of the vacancy in the office of president of the company. Their late President, Jacob Gratz, Esquire, had for a long time past expressed his desire to be relieved from the duties of that responsible and laborious office, and his intention to decline a re-election.

The managers long indulged the hope that that resolution might be changed; but his impaired health requiring the benefit of travel and change of air, he tendered his resignation of the presidency on the 18th October last, and the managers, while they deeply regretted it, could not, under the circumstances of the case, decline to accept it. Mr. Gratz had been a member of the board since the re-organization of the company in 1821, and had filled the office of President for three years; no member of the board ever discharged his duties with more zeal, or more assiduity.

The board have also to regret the death of Mr. William Y. Birch, one of the oldest and most respectable members of this board.

They have, however, pleasure in announcing to the

stockholders, that their colleague, William Boyd, Esquire, whose long connexion with, and valuable services to the company, highly qualify him for the situation, has accepted the invitation of the board to undertake the presidency of the company.

Annexed will be found the annual account of the treasurer, likewise a statement of the different articles and tonnage transported on the canal within the year.

By order of the Board of Managers,

CHARLES GRAFF,

President, pro. tem.

Union Canal Office, }
November 21, 1837. }

Dr. Union Canal Company in Account with Thomas P. Roberts, Treasurer. Cr.

1836. Nov.	To Cash expended by order of the Board of Managers, from November 1st, 1836, to February 1st, 1837, viz. Remitted to Wm. Lehman, resident engineer, to meet payments at Lebanon, for repairs, lock keepers' and superintendents' wages, collectors' salaries, damages and incidental expenses, - \$8,406 87 Paid claims for damages, - 1,654 74 Paid officers' salaries, - 1,562 50 Paid certificates of interest, - 88 98 Paid for improvements and repairs, - 1,500 00 Paid for coal for steam engines, - 630 00 Paid off temporary loans, - 4,554 00 Paid interest on loans, - 672 00 Paid for current expenses, - 247 75		\$10,440 67
	Total		10,477 75
Feb.	To Cash expended from February 1st, 1837, to May 1st, 1837, viz. From tolls, - - - 16,093 21 From temporary loan, - - - 3,476 34 From rent of oil mill, - - - 150 00		19,719 55
May.	By Cash received from May 1st, to August 1st, 1837, viz. From tolls, - - - - 47,055 33 From sale of old castings, - - - 120 00 From amounts returned for small notes, &c., - - - 279 00 From rent of schute at Pine Grove - 100 00		47,554 33
Aug.	By Cash received, from August 1st, to November 1st, 1837, viz. From tolls, - - - - 33,999 08 From sale of limestone and old castings, - - - 59 71 From L. Morris & Co. - - - 60 27 From notes paid, - - - 3,048 44 From temporary loan, - - - 2,500 00		39,667 50
	Total		13,268 57

May. To Cash expended from May 1st, to August 1st, 1837,

viz.	
Remitted to Wm. Lehman, R. E.	15,588 52
to meet payments at Lebanon, -	1,862 50
Paid officers' salaries, -	466 50
Paid interest on loans, -	331 73
Paid current expenses, -	737 50
Paid claims for damages, -	3,000 00
Paid temporary loan, -	23,038 50
Paid interest on loans -	261 63
Paid certificates of interest, -	
	45,286 88

Aug. To Cash paid from August 1st to November 1st, 1837,

Remitted to Wm. Lehman, R. E.	7,400 79
to meet payments at Lebanon, -	1,787 50
Paid officers' salaries, -	26,973 00
Paid interest on loans, -	234 63
Paid current expenses, -	1,017 00
Paid claims for damages, -	1,549 65
Paid temporary loan, -	1,887 32
Paid certificates of interest, -	
	40,849 95
	9,137 56

Balance,

127,859 80

Philadelphia, November 1st, 1837.

Examined, compared with the original entries, and found correct.

E. E. By Balance,

127,859 80

9,137 56

THOMAS P. ROBERTS, Treasurer.

CHARLES GRAFF,
CHARLES DUTILH,
Committee of Accounts.

*Statement of the Amount of Tonnage which passed the Union Canal, from
the first of November, 1836, to the first of November 1837.*

Flour, 40,727 barrels, weighing	-	-	-	8,715,595 pounds.
Grain, 461,014 bushels, -	-	-	-	27,660,894
Whisky, 9,557 barrels,	-	-	-	2,867,163
Iron, bar, castings, pig and rail iron,	-	-	-	15,126,267
Iron Ore, -	-	-	-	11,919,878
Coal, Anthracite, -	-	-	-	37,100,238
Coal, Bituminous, -	-	-	-	14,582,278
Lumber, 13,479,336 feet,	-	-	-	30,193,294
Shingles, -	-	-	-	5,435,808
Staves, -	-	-	-	1,254,614
Gypsum, -	-	-	-	23,057,359
Fish, 17,616 barrels, -	-	-	-	5,285,030
Salt, 107,386 bushels, -	-	-	-	6,443,192
Merchandise, -	-	-	-	27,401,748
Tobacco, -	-	-	-	342,702
Wool, -	-	-	-	66,403
Seeds of all kinds, -	-	-	-	1,231,931
Bacon and Pork, -	-	-	-	1,270,313
Cotton, -	-	-	-	202,548
Queensware, -	-	-	-	236,423
Leather, -	-	-	-	742,004
Nails, -	-	-	-	1,273,476
Sundries, consisting of limestone, bricks, butter, eggs, lard, grindstones, beans, rags, wood, glass, bark, &c. -	-	-	-	24,063,675
				<hr/> 246,472,833 <hr/>

equal to 110,032 Tons.

Amount of Tolls received during the year ending Nov. 1st, 1837.

Amounts to \$ 107,590 37.

Total number of boats which passed the Canal this year, 6,204.

THOMAS P. ROBERTS, *Treasurer.*

Philadelphia, Nov. 1st, 1837.

10up
ANNUAL REPORT

OF THE

DIRECTORS

OF THE

PHILADELPHIA

BOARD OF TRADE,

FOR THE YEAR

1837.

TO THE MEMBERS

OF

The Philadelphia Board of Trade.

GENTLEMEN,

Your Directors approach you with their Fifth Annual Report, and although commercial trials and distress have indeed characterized the period that has intervened since they had last the pleasure of addressing you, yet they cannot but feel authorized to declare, that the efforts of your association throughout the eventful and calamitous year just terminated, have proved of important advantage to those interests, which the establishment of the Institution was designed to secure and promote. The objects of its creation have been prosecuted with a zeal, unabated by the gloom and the tempest which have pervaded the whole country; and in the midst of difficulties, almost without a parallel, the great value of its concentrated exertions has been amply manifested. From the success which has, under such painful discouragements, attended the operations of the Association, and which has been but the continued emanation of its usefulness, from its earliest organization, a happy augury may well be indulged, in regard to its future benefits. Your Directors would therefore urge their fellow members to give to it their ardent and untiring support, in mutual efforts to augment the subscription list, and render effective those measures which may seem calculated to advance the prosperity of the trade and commerce of this great city.

It is a subject of no little exultation to your Directors, that while Philadelphia has participated in the common affliction, the good character of its merchants has been proudly

maintained—whatever defalcations have occurred elsewhere, *their* engagements have been punctually met: their moral integrity, their prudential and industrious habits, aided by abundant capital, have availed them much, and are substantial causes of elevated and grateful triumph. The storm is now comparatively over, without having impaired the reputation, or permanently affected the resources and energies of our still flourishing city. Brighter days we may hope are hastening—the Currency and Exchanges of the country, upon which its prosperity so much depends, are undergoing a general discussion; and we may well anticipate, from the combined influence of reason and suffering, a favorable issue. It would indeed be mournful to think, that the experience through which we have just passed, had failed to point out a remedy, and that the wisdom of our rulers, upon whom we are obliged mainly to rest our hopes of relief, had proved an unavailing reliance.

From the commercial embarrassments which have existed, fewer objects than usual have claimed the attention of your Directors since their last report. They are pleased to observe, however, that our *State System of Internal Improvement* has fully equalled the expectations hitherto entertained respecting it. The great utility of this majestic enterprize is acknowledged by every intelligent Pennsylvanian, who, while he enjoys with delight the contemplation of its progress thus far, looks upon the perfection of the scheme as an event worthy of his highest admiration and applause.

The *Transportation of Merchandise* on our Rail Roads and Canals, the past year, has been very much checked from the causes herein alluded to. But it is gratifying to reflect, that our emulating neighbours, both North and South of us, have found it expedient, if not necessary, to patronize our

improvements, in shipping a portion of their goods to the interior—while from the other extremity of the line, the great West has poured into our market the products of her soil, to an increasing extent; so that while our active and enterprising carriers have encountered a severe loss, in the limited transportation from East to West, they have been amply remunerated by their return freights. The important staples of Cotton and Tobacco, which until recently have been directed to other markets, or if they reached our own, came in small quantities, and by a very circuitous route, are now conveyed upon our own State Improvements to an accumulated degree, and by the aid of our *City Rail Road*, are passed into the noble warehouses, erected by the Corporation, at a great saving of time and expense. These articles thus relieved from heavy charges, and brought to the nearest possible point for shipment, will, it is believed, increase in quantity every returning year, and thus materially augment the revenues of the Commonwealth, at the same time, that they liberally add to the business of our city.

In connection with this subject your Directors have to observe, that they are anxious that a system of *Tobacco Inspection* should be established in our city, in order that a character for the article abroad, when shipped from this port, may equal that of any of the exports from any other part of the Union. To attain this desirable object, your Directors have already made some effort, and doubt not that they will, in the end, prove successful.

The subject of a *Telegraphic Communication* between the Capes of the Delaware and your city, has been under the consideration of your Directors for some time; and although a very favorable opinion is entertained by them of its usefulness, yet from a variety of causes, not necessary to be enu-

merated, the proposition has not yet been carried into effect. Confident hopes, however, are cherished, that ere long this desirable accession to the commercial convenience and advantages of the Port will be realized.

The establishment of our *City Ice Boat* for the purpose of keeping the navigation of the river Delaware open during the Winter season, is an event which all who desire the prosperity of this city and adjacent districts should hail with rapture. It is particularly interesting at this moment, when owing to the unparalleled severity of the two past Winters, and the great inefficiency of one of the Boats ever since her construction, in consequence of defective boilers, the affairs of the Steam Tow-boat Company are not in that prosperous state that could be desired. The debts of the Company amount to a sum which it is not in its power to discharge from its own means. Accordingly an appeal has been made to the several Corporations of the City and Districts for aid, and your Directors cannot doubt, that a system fraught with so much good to every branch of industry therein, will not be permitted to fail or languish for want of adequate support on the part of those most interested in sustaining it. For a more detailed account of the condition and prospects of the Company your Directors refer you to their present Annual Report.

In consequence of the numerous complaints made by the owners of goods, against the Transportation Companies, for delays in delivery—the subject of remunerating the former for damages thus sustained, has been considered by your Directors, and a Committee has been appointed, who are now in correspondence with the forwarders here and at Pittsburg, and there is every reason to believe, that a satisfactory arrangement will be accomplished.

Renewed exertions have been made to obtain an appropriation from Congress for the purpose of building a *new Custom-house* in this city. It is obvious to all, that the requirements of the revenue laws, enacted since the construction of the present edifice, have rendered the latter insufficient for its purposes. It is alike inconvenient to the officers and merchants, and unsafe for the valuable papers and property there deposited—such representations have been made at Washington as the case demanded, and there is no just reason to apprehend that the claims of our city to so necessary an improvement will be disregarded. It is due to the Collector and other officers of the Custom-house to state, that they have promptly contributed all the information desired of them on this subject.

A proposition for a *Dry Dock* at this station has also been urged upon the attention of our National and State Legislatures. The safety of our harbour—the abundance of our materials—the excellent workmanship of our mechanics, and the general facilities procurable here for the accomplishment of the project, are among the reasons which have originated the application. It is believed, moreover, that Pennsylvania has a right to claim a share of the National Disbursements, which have in a great measure been heretofore denied her.

The *Insolvent Laws* of Pennsylvania, and the States intimately connected with her in commerce, have an important bearing on the interests of our mercantile community, and seem to require such modifications as will secure a more faithful exaction of what is due to the creditor than the existing provisions afford, while at the same time the honest debtor may not be the object of cruel and tyrannical oppression, on the part of the former. With a hope that something beneficial to all concerned could be attained, your Directors ap-

pointed a Committee to examine the subject, and if necessary employ counsel. This Committee invited the co-operation of the Philadelphia Chamber of Commerce, and they are happy to have had an interchange of sentiment on this subject, with a highly respectable Committee of that body. After much and anxious deliberation, without coming to a definite conclusion as to the capacity of our own Legislature to correct the existing evils, it seemed that a National Bankrupt Law would be the best remedy that could be devised. By it the manifold objections to which the various Laws of the several States were subject would be removed, and a confidence created between buyers and sellers, which would operate greatly to the advantage of both parties.

Owing to the pecuniary difficulties which have so much and so long affected public undertakings, in almost every portion of our country, neither of the two important links of connection between the Pennsylvania and Ohio Canals through the State of Ohio, have yet been completed. It would indeed have afforded your Directors unspeakable pleasure could they have announced to you, at this time, the accomplishment of one or the other of these enterprizes. But though retarded, as these great works have been, by unavoidable causes, the surest prospects of success at no distant day, of at least one of them, are afforded. Your Directors would therefore observe, that whatever may have been or are now, the particular views of the Board of Trade, in regard to the relative merits of either route, that which promises to be first completed should claim its immediate and diligent attention.— They are accordingly gratified to perceive, that a *Memorial* of the Pennsylvania and Ohio Canal Company is now before the Legislature of this State, praying that a subscription of one hundred thousand dollars, on the part of the State, should

be made to the Stock of this Company, which, with a consequent realization of fifty thousand dollars from the State of Ohio, will, it is alleged, be sufficient to complete their improvement. Believing in the representations here made, and anticipating the most important results to the interests of the Commonwealth at large, while especial benefit would accrue to Philadelphia, from the accomplishment of the work in question, your Directors warmly recommend the promotion of the application which has been made to the Legislature, to your cordial and zealous support.

By order of the Board.

Thomas P. Cope,
PRESIDENT.

Jacob M. Thomas,
Secretary pro. tem.

Philadelphia, Jan. 19, 1838.

OFFICERS & DIRECTORS FOR 1838.

PRESIDENT,

Thomas P. Cope.

VICE-PRESIDENTS,

Robert Toland, Robert Patterson.

TREASURER,

Thomas C. Rockhill.

SECRETARY,

Frederick Fraley.

DIRECTORS,

Caleb Cope,	Joseph W. Ryers,
John S. Riddle,	Alexander M'Clurg,
William R. Thompson,	William Yardley, junr.
M. D. Lewis,	Henry Troth,
Thomas P. Hoopes,	William Buehler,
Richard D. Wood,	William S. Smith,
Alexander Read,	Joseph S. Riley,
Edward Roberts,	Joseph Hand,
Davis B. Stacey,	George N. Baker,
Stephen Baldwin,	Edmund Wilcox.
Charles S. Boker,	



MEMORIAL FOR IMPROVEMENT OF ALLEGANY RIVER, FROM PITTSBURG TO OLEAN.

MEMORIAL
OF
INHABITANTS OF PENNSYLVANIA,

PRAYING

Congress to make an appropriation for the improvement of the Allegany river.

JANUARY 16, 1837.

Printed by order of the House of Representatives.

To the honorable the Senate and House of Representatives of the United States of America in Congress assembled :

The undersigned, your memorialists, respectfully solicit the attention of your honorable bodies to the subject of the improvement of the Allegany river, for steam navigation, between Pittsburg, Pennsylvania, and Olean, New York. Frequently the attention of the public, and on different occasions that of Congress, for the last few years, has been called to the importance of the Allegany river, as opening a direct communication from the State of New York into the vast valley of the Mississippi; but its claim upon the favorable action of the General Government have hitherto been neglected or overlooked. Such is the geographical position of this river for local trade—extending into the State of New York, communicating with the Ohio; thence affording a water communication into twelve of the States of this republic—that, with the feasibility of the improvement once established, every impartial mind must concede its importance. But at no period has its importance been equal to the present. By the last Legislature of New York, a loan of three millions of dollars was granted to the New York and Erie Rail-road Company, (before incorporated with a capital of \$10,000,000,) also an appropriation made for the immediate construction of the Genesee Valley canal, from Rochester to this river; both of which improvements are in a state of rapid progress, and are to unite with the Allegany at, or in the vicinity of, Olean: so that, with these completed, nothing will remain but the improvement of the Allegany, to effect the long desired object of an uninterrupted communication by water and railway, from the city of New York, and the other great commercial emporiums of the Atlantic border, to the country bordering upon the Ohio, the

Mississippi Missouri, and their respective tributaries. Your memorialists would suggest, that one important consideration influencing the Legislature of New York in the construction of the aforesaid improvement, was the strong belief in the practicability of the improvement of this river, and the knowledge of its importance in reference to the trade of the Mississippi valley. The language of the directors of the rail-road company in their report, is "that the committee for investigating the subject became fully satisfied that in the Allegany river the State of New York possesses a source of internal navigation unequalled, during its continuance, for cheapness, security, and expedition; that its waters, gathered among its sources in Pennsylvania, become swelled by the various branches it receives within our limits, to a deep, smooth, and capacious river, flowing over a pebbled bottom, unobstructed by rocks or sand-bars, with a uniform descent from our State line, (192 miles,) to the great western emporium of Pittsburg; that the navigation of this stream remains open frequently until mid-winter; that it invariably opens within the first ten days of March, and often before that time, and always remains open, and perfectly available for the purpose of descending navigation, for at least six, and frequently for ten and twelve weeks in the spring; and, finally, that merchandise placed on its banks may be delivered in the warehouses of Pittsburg, in three days from the State line, and at an expense not exceeding fifteen cents per hundred pounds. It must be apparent, (the report continues,) how important it is to this State, and particularly to the merchants of our commercial metropolis, to have this navigation, aptly termed 'the key of the Mississippi,' placed within their reach. Opening, as it does, into the immense basin drained by that mighty river, it will enable our own metropolis to pour through its deep, safe, and rapid channel, in the early spring, a portion of the supplies for a population already exceeding three millions of souls." Of no less importance would the improvement of the Allegany be to the State of Pennsylvania—through which it chiefly passes—by opening for settlement extensive tracts of vacant lands adjacent to the river, in insuring to Pittsburg (her manufacturing emporium) the trade of the northeastern section of the Union, in the increased commerce upon the lines of the canal and rail-road completed, and in progress, that unite her eastern border with this river at Pittsburg, at Portsmouth, at Franklin, and at Warren; from the numerous navigable streams that reach far into the interior, and flow into the Allegany, which would become the avenues of more extensive trade; and from the general wealth which would be created by an enlarged market for the mineral productions (coal, salt, and iron ore) that extensively abound in the western part of this State.

Your memorialists feel confident in the belief, that the feasibility of rendering the river navigable for regular steam navigation, is sufficiently established to warrant your honorable bodies in making an immediate appropriation for its improvement. Already various steamboats have frequently ascended the river—some to Franklin, (115 miles,) some to Warren, (180 miles,) and one to Olean, (a distance from Pittsburg of 250 miles,) without obstruction or injury. In the different surveys made of the river, by competent engineers, as that of Judge Geddes, in the summer of 1826, under the authority of the State of Pennsylvania; again, in 1828, by Edward F. Hay, Esq., also of Pennsylvania; and in the same summer by Col. Kearney, United States topographical engineer, in pursuance of a resolution of Congress, they all agree in their observations as to the general features

of the river, and in the fact that it can be rendered navigable for steamboats at a small expense; also, in the mode by which the improvement might be effected.

The Allegany, for a greater part of its course, flows not through a valley, like most other rivers, but through a great ravine, from 100 to 400 feet below the common bed of the adjacent country. Another peculiarity of this stream, is, the regular succession of alternate ripples and deep pools. The ripples are generally short, and the descent inconsiderable, over which the water flows with a smooth but rapid current, though not so swift but that a steamboat of light draught and ordinary power can ascend them without difficulty, as has been done repeatedly. The current in the pools is very gentle at low water, but during high water it becomes very nearly uniform. Although the river seems to have worn for itself its present depressed bed, by cutting through various horizontal strata of rock; yet there are no rocks, strictly so called, in its channel—nothing but round pebbles. The ripples are composed exclusively of these, apparently scooped out of the pools above. No river is, therefore, better adapted to improvement, by artificial means, than the Allegany, either by a succession of low dams and locks, or by merely concentrating the channel upon the ripples, so as to give sufficient depth of water at all seasons for steamboats. It is, indeed, a remarkable fact, that the Allegany should pursue an even course through so mountainous a country from Olean to Pittsburg; (250 miles,) with the average descent only about two and a half feet per mile, without one perpendicular fall or impediment that cannot easily be removed, and would seem to indicate the design of nature that its bed should yet become the resort of extensive trade from all parts of the Union.

Your memorialists are aware of the objections to local improvements by the General Government; but they present this subject to the consideration of your honorable bodies, with the fullest persuasion that it can be regarded in no other light than as a work of great national importance; and one which, upon its completion, cannot fail to “promote the public welfare, and facilitate the common defence.” To establish its public utility, it need but be stated that the Allegany, upon improvement, will become the connecting link in the great chain of communication between the Hudson and the Mississippi, the northeastern and southwestern States—a communication more direct, safe, and expeditious, than can elsewhere be found; that all of the New England States, the States of New York and Pennsylvania, and all those bordering upon the Ohio, Missouri, and Mississippi, and the navigable waters communicating with them, comprising at least twenty of the States and Territories of the Union, are directly interested, and would be extensively benefitted by this improvement.

Improve the Allegany river to Olean, and from that point a water communication is obtained of over 12,000 miles, far into the heart of the most fertile country on the globe; upon whose plain, as has been forcibly stated, “Europe might comfortably seat all of her nations.” Communicating with so fertile a country, so boundless in extent, its resources now but partially developed, it would be impossible to estimate the vast amount of trade that would flow through this source into the Mississippi valley, from all of the commercial towns upon the Atlantic border, and the return supplies that they would derive of all the necessary products of the earth, for their ever increasing population. The public utility of this improvement is then evident. That it would facilitate the common defence in time of war

qually evident. And this consideration alone is sufficient, in the opinion of your memorialists, to warrant the General Government in an appropriation for the improvement, from a proper regard to the prudent maxim, "in peace we should prepare for war;" and from the experience we obtained of the want of such a communication during our last war, in the vexatious delays and immense expense we were subjected to in the transportation of our troops, &c. from Pittsburg to the northern frontier, which was, as has been ascertained, not less than \$3,000,000.

Never, perhaps, has the spirit of enterprise so universally pervaded our whole country as at the present period. States vying with each other in the construction of works of internal improvement, rail-roads and canals are traversing the Union in every direction, by means of which the most remote portions are brought in almost immediate vicinage; a greater community of interest, by the increased commerce, is thus created; sectional asperities are removed, and the general wealth of the republic vastly augmented.

Your memorialists would notice a few of these contemplated improvements, which have a bearing upon the subject of the Allegany river. The New York and Erie rail-road, from the Hudson to this river, and the Genesee Valley canal, have already been noticed. The State of Massachusetts has projected a rail-road from the city of Boston to unite with the New York improvements, by which the New England States would come in for a participation of the advantages of the Allegany. A rail-road is in contemplation to extend from the city of Charleston, South Carolina, to Cincinnati, Ohio, which will there intersect the line of communication of which the Allegany is a part. The great rail-road from New Orleans to Louisville, Kentucky, through the States of Louisiana, Mississippi, Tennessee, and Kentucky, one of the most stupendous projects of the age, which is now in progress, will, upon its completion, and upon the improvement of the Allegany river, in connexion with the New York and Erie rail-road, complete a chain of internal communication from the city of New York to New Orleans—a distance of three thousand miles, unsurpassed in extent, expedition, and magnificence, by any other of like nature in the world; and, as estimated, would bring these two great commercial emporiums within but one week's travel of each other. The completion of these different improvements may be safely counted upon within a very few years. It is impossible, in this brief space, to enumerate the advantages that would then result to the Union at large, by the improvement of this one avenue, the facilities it would afford to general commerce, the wealth it would create, or at all estimate the vast amount of trade that would find its way through its channel. This must continue to increase with the same wonderful rapidity that has marked the development of the resources of the plain of the Mississippi, and its unparalleled augmentations in wealth and population.

Your memorialists would call the attention of your honorable bodies to the fact, that the country bordering upon the Allegany river is rich in mineral products; there being in this section very numerous and extensive beds of bituminous coal, salt, and iron ore; all of which are articles of increasing demand in the eastern section of our country, and from which their supplies would chiefly be drawn.

Such is the present abundance of our national treasury, that the small diversion of sufficient to improve the Allegany river would not be felt.

and, compared with its importance in case of war alone, the expense should not be regarded as the least objection. We have the sanction of frequent precedents of appropriations for similar improvements; they are regarded by the people in a favorable light, as an unfailing source of increased wealth to every department of industry; facilitating trade, opening the sequestered portions of the country, developing their resources, and affording the strongest ligaments to unite us together as a nation, by making the interests of the most remote sections emphatically one. The subject of the improvement of the Allegany river between Pittsburg, in the State of Pennsylvania, and Olean, in the State of New York, is respectfully submitted with the confident hope that the wishes of your memorialists will be granted, by a liberal appropriation for that purpose, and thereby added to the happiness and prosperity of a very large portion of your fellow citizens. And your memorialists will ever pray, &c.

N. W. GOODRICH
and 25 others.







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